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THE JOHN C. CRERAN
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Contractors *and* Engineers' Monthly



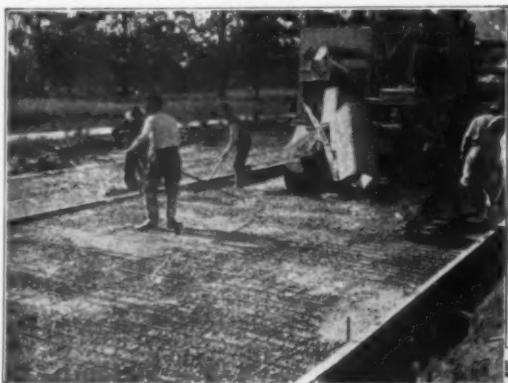
Construction Scene on the Pensacola-Gulf Highway Described in This Issue

JANUARY, 1924

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TRUSCON WIRE MESH AND CONTRACTION JOINTS

VOL. VIII. No. 1

CONTRACTORS' & ENGINEERS' MONTHLY

JANUARY, 1924

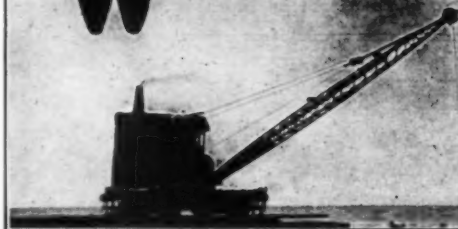
Entered as second-class matter, April 16, 1923, at the Post Office at New York, N. Y., under Act of March 3, 1879

Issued Monthly, by The Bittenheim-Dix Publishing Corp., 443 Fourth Ave., New York

Price 25 Cents, \$1 Yearly

Printed in U. S. A.

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A comprehensive classification of the leading machinery and supply manufacturers arranged for the convenience of contractors, engineers and public officials who may wish to secure information about construction equipment. A star (*) before the manufacturer's name indicates that his advertisement appears in this issue.

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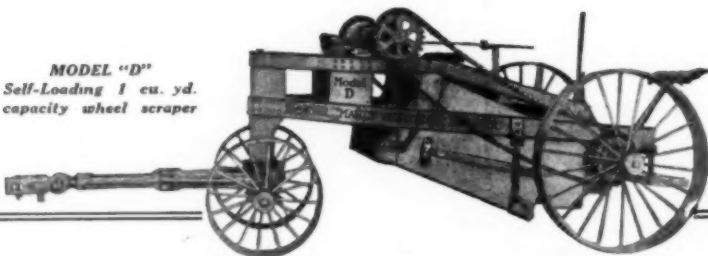
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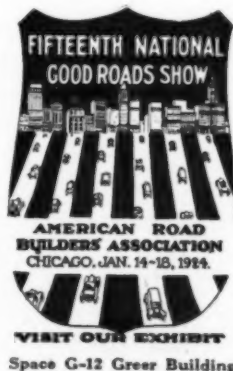
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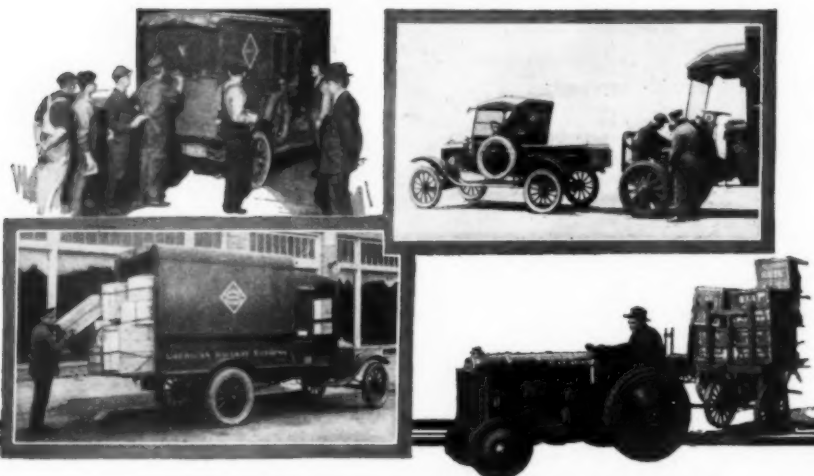
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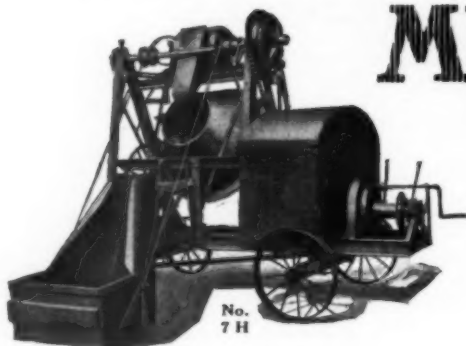
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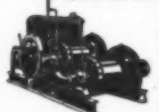
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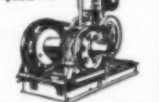
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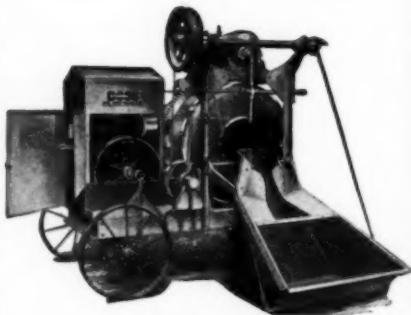
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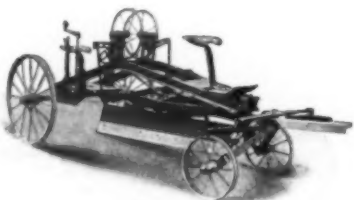
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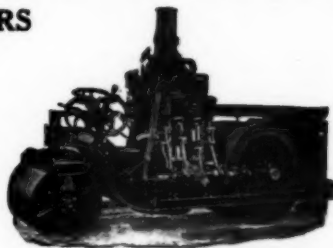
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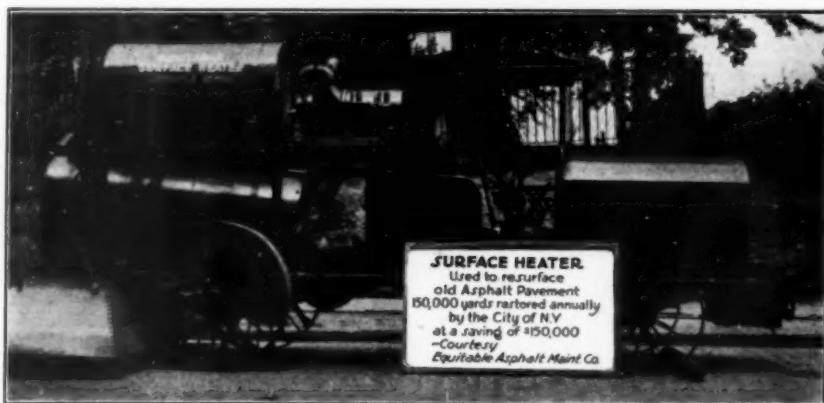
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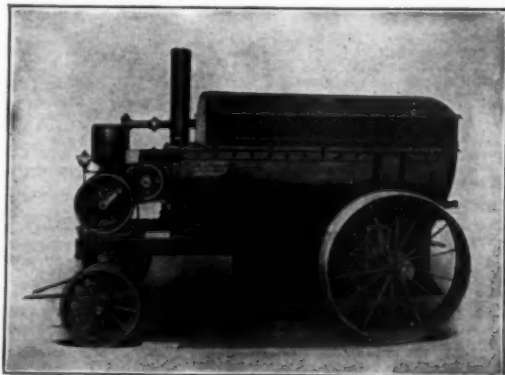


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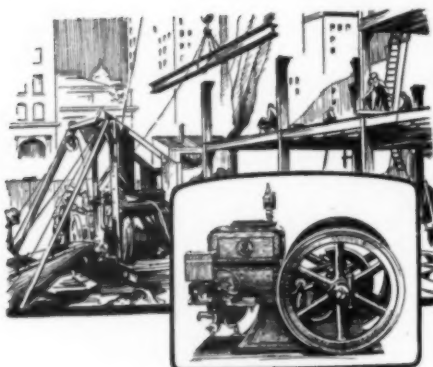
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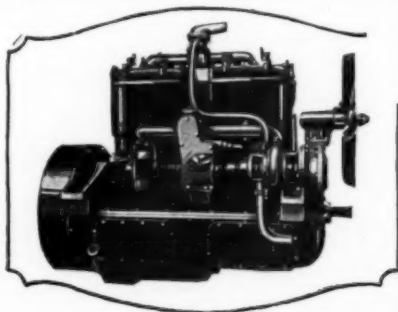
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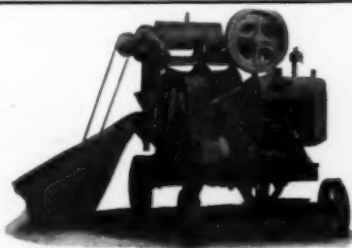
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Vol. VIII

No. 1

Contractors' and Engineers' Monthly

January

1924

Published Monthly at 443 Fourth Ave., New York, by The Battenheim-Dix Publishing Corp.
Branch Offices: Chicago, Ill., 128 W. Madison Street; San Francisco, Calif., 320 Market Street

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Use Made of Mules, Trucks, Electric Railway and Industrial Railway to Handle Material and Prosecute Construction

By Charles E. Parker

Speed-Parker, Inc., Contractors, Louisville, Ky.

PENSACOLA itself is situated on the wonderful harbor of Pensacola Bay and, aside from this body of water, the city has the advantage of many bayous and lagoons, all of which afford bathing beaches and wonderful fishing grounds. Still, there was no opportunity to reach the Gulf of Mexico for the enjoyment of surf bathing otherwise than by boat rides. There was a trail leading to the Gulf beach and at times there had been an attempt to make this a clay-surfaced road, but the country through which it was laid was hard of approach. The ground is sandy and swept by the winds of the Gulf of Mexico, so that with an inadequate amount

of money the clay road had never been a success. During this delay of many years, people of foresight and vision had dreamed of some day having a permanent road, one that would attract tourists and offer the opportunity of settlement on their Gulf beach which would prove attractive to outside capital.

Financing the Project

About two years ago Escambia County, with Pensacola as the only important city within its boundaries, voted a bond issue of \$2,000,000 for road construction. The issue was popular with the people of Pensacola, as \$500,000 was set aside to construct a road leading from the city through a tract of practically uninhabited territory to the Gulf of Mexico. The construction of this particular road is described on the following pages.

The Project

The Gulf Beach Highway starts about three miles outside of Pensacola, branching off from a concrete pavement known as the Barrancas Road, and the contract consisted in laying a new road in practically virgin territory. Along the entire route there was scarcely a house, and the few plantations were rather



THE COMPLETED HIGHWAY ALONG THE GULF

poor and unprofitable, though in many places the soil is rich and dark and will grow vegetables and Satsuma oranges most profitably.

The proposed location of the road during its construction was changed several times in order to secure the best scenic effect, and the final layout was arrived at through the care and attention of the engineers in charge, who made it border lagoons and bayous, taking advantage of all ridges and high ground to improve the scenic charm of the highway.

The construction contract was awarded to Speed-Parker, Inc., engineers and contractors, of Louisville, Ky., and the road was built under the direct supervision of R. D. Orders, Vice-President and Manager of this company, and J. P. Herndon, Engineer and Secretary of the company, both resident on the job throughout its entire construction.

Starting Construction

The first work on the road was to extend the electric railway line out of Pensacola $1\frac{1}{2}$ miles

in the tunnel construction and reloaded onto batch boxes which were ready to start on their long haul to the mixer.

It was intended to roll the subgrade of the road with 5-ton or even 10-ton rollers. These machines were brought into the country, but proved impracticable because of the deep sand. It was found that a much better subgrade could be procured by settling with water. Fortunately the water-supply was very adequate. Numerous small streams, lakes and ponds were available, and in stretches where these were impractical water could be obtained through wells at a depth of not over 12 to 15 feet. The carrying forward of pumping equipment increased in difficulty as the road progressed, and finally two fire engines were procured and because of their ease of transportation solved the difficulty admirably.

The Pavement Itself

The pavement was of the highest type of concrete construction, using a 1:2:3 mix rein-



TYPICAL VIEW OF RIGHT OF WAY BEFORE THE CONSTRUCTION OF THE PENSACOLA-GULF HIGHWAY, SHOWING CONCRETE CULVERT ALREADY BUILT

and then build a high track with a tunnel dump, establishing one unloading place for the whole project about $\frac{3}{4}$ -mile from the first stake. Then an industrial railway was laid for the rest of the distance, approximating 12 miles. The industrial road was laid with standard rail and wooden cross-ties.

The country is low and sandy, and where material was trucked and teamed forward for culverts and bridges ahead of the industrial haul, almost insuperable difficulties were encountered, proving conclusively that the industrial haul was the only method of economically constructing this highway.

Sand and gravel were obtained from points near Flomaton, Ala., and were brought in by rail to Pensacola, switched by the electric line to the contractor's unloading point, then dumped

forced with 45 pounds of galvanized steel mesh, with $\frac{3}{4}$ -inch round bars placed at each expansion joint 30 feet apart. The pavement was $\frac{5}{8}$ inches thick at the edges and $7\frac{1}{2}$ inches thick at the center. Heltzel steel forms were used for lining up the sides, and every 30 feet expansion joints were installed, using steel templates conforming to the crown of the road and slightly beveled to make it easy to lift them the day following placing.

One-half of the work was done with Atlas portland cement brought from Leeds, Ala., and the remainder with Dixie Royal cement. The sand and gravel were of high quality, and it is the opinion of the engineers on the project that the subgrade could not have been better and that this highway will probably require no maintenance other than shoulder work for many



A TYPICAL CONSTRUCTION SCENE ON THE PENSACOLA-GULF HIGHWAY, SHOWING FOOTE MIXER, LAKEWOOD FINISHER AND BATCH BOXES

Note one of the completed culverts, which was built under difficulties prior to the construction of the road

years to come. The first part of the road today is $1\frac{1}{2}$ years old and from zero station to the end of the project on the road completed it is impossible to find a crack or check in the pavement. There were two small bridges to construct and numerous swamps to negotiate, but with all the fills made of sand and with a perfectly watered and settled subgrade and the pavement bearing on sand with the pressure equal throughout its bearing surface, it is reasonable to believe that there will be no cracks in the road for many years to come.

Construction Equipment

Seven-ton Whitcombe and Burton industrial

locomotives were used for motive power, with Lakewood cars and batch boxes for carrying the material. A 21-E gasoline Foote mixer with boom and bucket and derrick attachment was used throughout the entire project for mixing and placing the concrete. Reinforcing steel, railroad iron, gas and oil, as well as all extra supplies whenever possible, were carried forward to the work on flat cars ahead of the locomotive, in an attempt to minimize any truck or team haulage through the deep sand. The finish of the road was accomplished with a Lakewood finisher, which proved very satisfactory.

As the points of operation stretched farther



THE INDUSTRIAL RAILWAY EQUIPMENT WHICH WORKED DAY AND NIGHT TO EXPEDITE THE CONSTRUCTION OF THE PENSACOLA-GULF HIGHWAY

and farther away from the loading point, it became necessary to load as much material as possible at night. Then by running one or sometimes two locomotives, material could be on hand for the morning start each day. The need of this can be readily understood when one considers that in the last miles of the road practically three hours was consumed for a round trip between the mixer and the loading track for a single train. As a rule, the material going to the mixer was relayed, one engine operating between the plant and the first switch for a distance of about three miles. The second engine returned its empties and picked up the train at the switch to carry it forward to its three-mile terminus. This was found more efficient practise than to send a train the whole distance from plant to mixer.

The construction of the road was never particularly rapid, but every effort was made to maintain a steady progress. The supply of sand and gravel at times was inadequate during

construction. There were delays from railroad strikes, car shortages and bad weather. The stipulated time for the completion of the road at its commencement was 360 days. This time was prolonged about 90 days, but all penalties due to the delay were promptly waived by the County Commissioners, who were at all times in close touch with the contractors, working in harmony with them, realizing their difficulties and delays, and extending the most cordial assistance. The final cost of construction of the highway was \$412,000.

The completion of the Gulf beach highway is pronounced a creditable achievement. Credit is due to the engineers, Winston E. Wheat and Charles W. Douglas, who gave their services, but much more than their services, in the conception, planning and execution of this highway. The County Commissioners for Escambia County are Frank J. Riera, Jeff M. Herrington, H. E. Gandy, T. T. Wentworth, Jr., and L. S. Gilmore.

Construction Under Way in Montreal This Winter

ACCORDING to a report in *The Canadian Engineer*, construction work in the city of Montreal and district is continuing right through the winter, as the general public is cooperating with building contractors. That it is possible to proceed with building construction in Montreal right through the year even when the thermometer hovers some degrees below the zero point and snow-storms swirl about the city, is the opinion of Douglas Bremner, President of the Builders Exchange. Further than that, Mr. Bremner has affirmed that construction can be carried on more economically during the winter months than during the spring and summer months, when most people are anxious to undertake building programs.

"It is the reluctance on the part of the public to appreciate that it is possible to construct as economically in the winter as in any other part of the year that causes the building season here [in Montreal] to be restricted and provides a reason for many mechanics leaving the city, many of whom do not return. Under these

existing conditions it is difficult to provide employment in the building industry for the whole twelve months of the year.

"If the public would only realize what we have proved—that building can be continued through the winter months, and not wait, as so many want to, until the spring before undertaking their building programs, we should have uniform building all the year. That is what the Builders Exchange is trying to effect. Last year the Exchange conducted an extensive educational campaign along these lines which was productive of a measure of results. At the present time many of the larger contractors have just as large a pay-roll in the winter as in the summer, which shows that the idea is gaining."

Some important buildings in Montreal now under construction are the new Court House, the City Hall, the Caron Building on Bleury Street at the corner of Concord Street, which will be ten stories high, and the Keefer Building at the corner of Mackay and St. Catherine Streets, another 10-story office building.

What Is an Architect?

CLIENT.—The chief source of an architect's education; a modern iconoclast; a non-conformist who would not object to a gothic spire on a three-room bungalow; a patron of the art of architecture, the paymaster and the taskmaster of the architect.

"Clients rush in where angels fear to tread."

"Clients are necessary evils."

Contractor.—One who goes to an architect for an order to collect money from a client.

Contract.—An oral or written agreement to do something or somebody; usually void, or voidable on technicalities, unless drawn by an architect.

—The Rochester Engineer.

MAY THE NEW YEAR BRING INCREASED PROSPERITY

We extend to readers of CONTRACTORS' AND ENGINEERS' MONTHLY our sincere wishes that 1924 may be one of unequalled prosperity.—The Editor.

LEGAL POINTS FOR CONTRACTORS

These brief abstracts of court decisions in the contracting fields may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt, consult your own lawyer

Edited by A. L. H. Street, Attorney-at-Law

Contractor's Claim on Account of Misrepresentations

A contractor does not waive a claim for damages through being induced to enter into a contract involving excavation by false representations made to him as to the nature of material to be excavated, by proceeding with the work after discovering the falsity of the representations, holds the United States District Court for the Southern District of Ohio in the case of Maryland Casualty Company vs. City of Cincinnati, 291 Federal Reporter, 834.

As a precedent supporting the decision, the Court cites a similar holding by the United States Supreme Court in the case of United States vs. Atlantic Dredging Company, 253 United States Reports, 234.

Duties of Contractors Who Excavate in Streets

Concerning the liability of a municipal paving contractor for injury caused by a street car passenger alighting in a hole left in a street, the New York Court of Appeals said in the case of Brown vs. German Rock Asphalt Co., 140 Northeastern Reporter, 695:

"Where one under a contract with a municipal corporation has made an excavation in a public street or highway and refilled the same, it is his duty to anticipate the result upon it of a rainfall, and to see that during and after a rain it is in a proper and safe condition, or to take such measures of prudent forethought as will protect the public passer-by from danger. . . .

"The defendant, having opened the street, dug the trench, and refilled it, was charged with the duty of restoring it to a reasonably safe condition. As its contract was not complete until it had resurfaced the trench, it still had power and the right of supervision over it. . . . Under these circumstances it was called upon to exercise reasonable care to keep the highway reasonably safe until the asphalt had been replaced, or the street repaved."

Engineer's Right to Require Continuous Pouring of Concrete

Concerning performance of a contract to construct a bridge across the Arkansas River at Fort Smith, Ark., and the manner in which the contractor was required by the engineer to do the work, the United States Circuit Court of Appeals, Eighth Circuit, said in the recent case of Elkan vs. Sebastian Bridge District, 291 Federal Reporter, 532:

"It is contended that this concrete was

ordered done by a 'continuous pour,' which made the work more expensive and also resulted, because of high waters, in considerable loss of material which was being assembled, and necessarily assembled, for this continuous pour, and constituted a departure from the contract. . . . The specifications are entirely silent as to the specific matter of the manner of concrete pouring in connection with the piers. However, we think the general and rather generous powers given by the specifications to the engineer over the contractor in the performance of the work cover such authority."

Coverage by Contractors' Bonds

A contractor for the construction of a county highway in Texas gave bond to pay for all labor and material furnished in the construction of the road. In the case of United States Fidelity & Guaranty Co. vs. Henderson County, 253 Southwestern Reporter, 835, the Texas Court of Civil Appeals held that the bond covered feed furnished for mules used on the job, but not provisions consumed by laborers unless furnishing board was a necessary part of the work, nor labor expended by blacksmiths employed to repair tools and machinery.

The Court followed a decision of the United States Supreme Court to the effect that such a bond covers provisions consumed by laborers only "when the work was done under conditions which imposed upon him the duty and necessity of furnishing board and lodging for his employees."

Contractor's Rights as to Uncontemplated Subsoil Conditions

The case of Elkan vs. Sebastian Bridge District, 291 Federal Reporter, 532, decided by the United States Circuit Court of Appeals, Eighth Circuit, involved plaintiff's right to annul a contract for the construction of a bridge and to recover for work done on the basis of reasonable value, under a claim that he was induced to enter into the contract through misrepresentations as to the nature of subsoil conditions.

The Court decided that the contractor could not claim to have been deceived as to subsoil conditions merely by reason of their varying from borings made by the bridge district's engineer. In the absence of a warranty by the district that the borings and subsoil conditions corresponded, the district was merely bound to correctly show the result of the borings.

Effect of Non-Resident Corporation's Failure to Pay License Tax

Interpreting and applying the statutes of Oklahoma governing the doing of business in that state by non-resident corporations, the local Supreme Court lately decided in the case of Dolese Brothers Company vs. Pacific Engineering and Construction Company, 218 Pacific Reporter, 798, that a corporation which had filed copies of its articles of incorporation and had otherwise complied with the statutes did not render its contracts made in the state void because of failure to pay its license tax.

Contractor's Right to Reimbursement Against Extra Expense

Specifications for additions to a water system provided that broken stone must be clean and of certain size, and that it would be subject to approval or rejection by the engineer. It was also provided that if bidders suspected possible difference between themselves and the engineer as to the meaning of the specifications, they must ascertain, and bid upon, the engineer's understanding. Plaintiff, the successful bidder, was assured by the engineer that the bid could be based on the use of local stone. Under these conditions, it was decided by the New Hampshire Supreme Court in the case of Osgood Construction Company vs. Town of Claremont, 122 Atlantic Reporter, 346, that the contract entitled plaintiff to use local stone, and that, being required by the municipality to use foreign stone, because local stone was found to be unsuitable, the contractor was entitled to reimbursement for the extra expense.

Contractor's Right on Owner's Failure to Pay Installment Due

Under a contract to do certain work for a lump sum, payable in installments during the progress of the work, the contractor is not entitled to judgment for an installment due, on abandoning the work on account of non-payment of the installment, according to the decision of the Vermont Supreme Court in the case of Peist v. Richmond, 122 Atlantic Reporter, 420. He must sue for damages for breach of the contract, or for the reasonable value of the work done. In that case the Court said:

"The defendant's failure to make the payment called for by his engagement was a breach of the contract that went to its essence. The situation thus presented to the plaintiff did not, in the respect here involved, differ from what it would have been if the defendant had prevented him from carrying out the contract. . . . He, not being in default, could treat the contract as terminated, and without further performance seek his remedy in the courts. . . .

"When the plaintiff was ready to bring his suit, he had a choice of remedies. He could sue upon the contract and recover his damages for its breach; or, disregarding the contract, he could sue for a reasonable compensation for what he had done. . . . But, if one pursues

the first-named remedy, he must declare upon the contract, and his damages will be regulated by the contract price; while, if one selects the last-named remedy, the contract price does not control his damages, and he recovers quantum meruit [reasonable value]."

When Employee's Disobedience of Order Defeats Claim for Injury

A construction employee was injured through the falling of a temporary elevator which was being installed for use in hoisting building materials. He filed claim against his employers under the Nebraska Employers' Liability Law, asserting that the injury arose out of and in the course of his employment. The trial court decided against the claim, on the ground that it appeared that claimant had gone upon the elevator in violation of orders from his employers not to do so, although at the time he may have been attempting to adjust the elevator. Affirming this decision, in the case of Hibberd vs. Hughey, 194 Northwestern Reporter, 859, the Nebraska Supreme Court said, in part:

"The general rule is that an injury arises out of his employment when the servant is performing some service for the master, although in a manner contrary to his instructions; and this because he is acting within the scope of his employment and his departure from instructions were mere acts of disobedience.

"There is evidence in the record, however, that appellant was directed not to get onto the elevator at the very time he was told to lower it to the floor level. If this fact is proved, then another element enters into the problem, viz., that the servant was disobedient as to the place where he should perform his work."

The Man Who Counts

By Theodore Roosevelt

It is not the critic who counts; not the man who points out how the strong man stumbled, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood; who strives valiantly; who errs and comes short again and again, because there is no effort without error and shortcoming; who does actually strive to do the deeds; who knows the great enthusiasm, the great devotions, spends himself in a worthy cause; who at the best knows in the end the triumph of high achievement, and who at the worst if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who know neither victory nor defeat.

Building the 54-Mile Aqueduct for the City of Tulsa, Oklahoma

Water from Spavinaw Creek in the Ozarks to Be Brought Through 54 Miles of Concrete Pipe

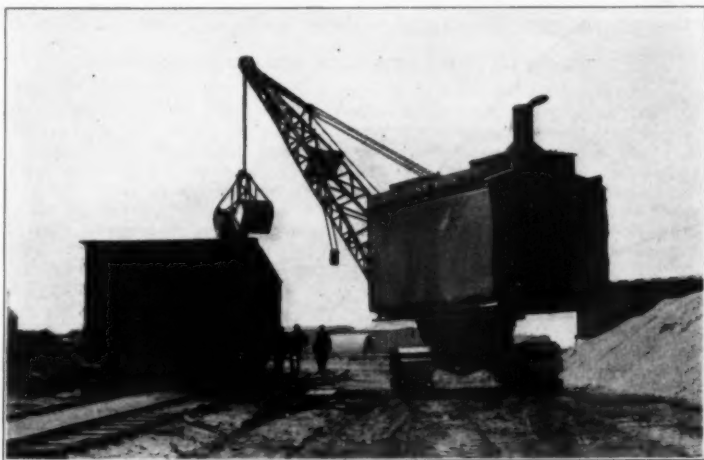
IN 1890 there was no Tulsa, Oklahoma. To-day Tulsa is a city of 72,000 people and is ambitious and prosperous enough to spend \$6,800,000 in the development of a permanent and adequate water-supply. The rapid growth of the city has outstripped the existing water-supply, and the citizens have been reduced to the necessity of buying bottled drinking water, paying at the rate of 25 cents for 5 gallons. It was realized that extraordinary measures would have to be resorted to in order to insure an ample water-supply, so in November, 1921, \$6,800,000 was voted for the purpose.

Back in the Ozark mountains, 55 miles to the northeast, is Spavinaw Creek, a beautiful stream of pure, sparkling water which answers all of Tulsa's requirements in quality and

concrete pipe from the Tiawah tunnel to the Mohawk reservoir; the Mohawk reservoir; and, finally, a high-pressure reservoir of several million gallons capacity.

It is the construction of the 54 miles of concrete aqueduct which we will discuss in the following article, partly because this is undoubtedly the most extensive use ever made of concrete pipe for carrying water under pressure, and partly because of the large and interesting plant and organization of the contractor.

Last October Verdigris, Okla., was merely an insignificant station on the Frisco Railroad, a huddle of three or four houses out on the prairie. To-day the immense concrete pipe manufacturing plant of the Lock Joint Pipe



A 10-TON AMERICAN CRANE ON CONTINUOUS CHAIN TREADS, UNLOADING AGGREGATE

quantity. The only question was the feasibility of bringing the water such a long distance. A number of engineers were consulted about the project, and it was their opinion that the scheme was quite practicable, so Tulsa rolled up its figurative sleeves, found the funds and let a bewildering series of smacking big contracts. The engineers for this project are E. J. Trammell and W. R. Holway, 508 Wright Building, Tulsa, and Dabney H. Maury of Chicago is consulting engineer.

Separate contracts were let for a 60-mile telephone line; clearing the Spavinaw lake site; the Spavinaw dam; 28 miles of 66-inch concrete pipe from the Dam to the Tiawah tunnel; the tunnel itself; the 24 miles of 54-inch

Company of Ampere, N. J., covers 45 acres along the railroad, and off on the hill are a dozen bungalows where the superintendents live. The plant includes four complete pipe-making units, cement sheds, concrete mixers, mountains of sand and crushed stone, seven American locomotive cranes, four American hoisting engines operating the four big double gantries, racks for curing the pipe, a machine shop, a galvanizing plant, dormitories, commissary where 300 men eat at once, and offices.

It is a huge job, but the plant is well equipped. Five of the locomotive cranes of 25 tons capacity run on flanged wheels, and two are of 10 tons capacity, running on continuous chain treads. These, with the four gantry cranes operated by 7 by 10 American hoisting engines,



GANTRY LIFTING A LENGTH OF PIPE OFF CASTING BASE

handle all the material, including the trench excavation and some of the backfilling. The continuous chain tread machines are used for everything from excavating to placing pipe and can go anywhere. Their independence from tracks makes them particularly valuable. One of these machines, carrying its clam-shell bucket, crossed a dry creek, going down and up the 20 per cent banks without the least trouble.

Stocks of Materials

In order to insure maximum progress, it is necessary to carry great stocks of materials. Approximately 6,000 tons of crushed stone are on hand all the time, as well as 4,000 tons of sand, 10,000 barrels of cement, and 1,000 tons of reinforcing steel in all the needed sizes and lengths. Back of each of the four pipe-making units is a large storage area floored with oak, on which about 3,000 tons of stone, sand and cement is kept available. The sand and stone are unloaded from the cars in which they are received by an American 10-ton crane, handling a $\frac{3}{4}$ -yard bucket. The yard in which the reinforcing steel is stored has a center track along which the bars are stored, and two outside tracks which serve the mesh storage piles.

The pipe plant and storage yard has one rail connection to the Frisco and one to the contractor's own private construction railway. Altogether the storage yards contain about 3 miles of track.

The Pipe Yards

The concrete pipe which is being made at Verdigris is in 12-foot lengths, and the pipe

walls are about 6 inches thick. It is cast in steel molds set on end. By working the plant in two 8-hour shifts, it is possible to turn out 96 of these pipe lengths every 24 hours. The four gantry cranes carry the concrete from the mixers, pour it, lift the molds from the pipe, lift the pipe onto the curing racks, and reset the molds for the next pouring. Four small mixers are used in each casting unit, each unit being served by one of the gantries. One casting unit can turn out 24 pipe sections a day, 96 in all, or 1,152 feet of pipe line.

The pipe reinforcing consists of an inner cage of steel with longitudinal rods fastened to the bell-and-spigot rings, and an outer cage of steel spaced from the outside form. The steel area in the cages varies to conform with the pressures which pipes in different parts of the line are called upon to withstand. The aggregate specifications are one part cement, one and a half parts sand, and two parts stone. Every bit of aggregate is carefully measured to insure uniform mixes.

After a section of pipe has been poured, it is covered with a canvas jacket and steamed for three days, although the forms are removed at the end of the first day. The pipes are further cured by being left on racks about ten days before they are loaded on standard railroad flat cars and hauled in trains of a dozen cars out to the trench where they are to be laid. A standard-gage railroad runs all the way along the 55-mile line of the aqueduct. The construction of this railroad and the telephone line which parallels it was the contractor's first big task.

The handling of the heavy pipe has been so

carefully planned and organized that it is the work of a very few minutes to unload a train load of pipe along the trench where it is to be laid, although each joint weighs about 7 tons. The center of each piece of pipe is conspicuously marked with red, and when the locomotive crane picks it up with the sling attached at the point marked, the pipe remains perfectly balanced as it is swung into the trench. The 25-ton locomotive crane's one-flanged track wheels operate over portable track sections which they transfer as the work progresses, and the 10-ton machines on continuous chain treads, which makes them independent of rails, are found particularly valuable where the ground is soft. Besides placing the pipe, these machines are used for excavating and back-filling with clam-shell buckets. Usually the pipes are not picked up from the cars by the cranes and placed in the ditch but are snubbed from the flat cars to the ground by means of a special device. Pipe sections are taken out and distributed along the trench as rapidly as the manufacturing process will permit. Both steam and gasoline machines are used in digging the trench, and practically every sort of material has been encountered, from solid rock to running sand. The greater part of the work, however, is in what is known as "gumbo." The trench averages $7\frac{1}{2}$ feet wide and $8\frac{1}{2}$ feet deep. Where necessary, the bottom of the trench is prepared for the pipe by hand trimming, but the great part of it is dug so carefully that trimming and leveling off the bottom is not necessary.

Four 25-ton locomotive cranes on flanged-track wheels and one 10-ton locomotive crane on continuous chain treads are used to place the pipe sections in the trench. Four men besides the crane engineer are used with each pipe-laying crane.

With the patented "Lock Joint" feature, making the joint is the work of but a few minutes. This joint was first used on sewer pipe made by the Lock Joint Pipe Company. It consists of a heavy steel bell-and-spigot ring, galvanized to resist moisture and calked from the inside of the pipe with a precast lead gasket after the pipe is laid. Every joint is an expansion joint, and the joint takes care of the expansion or contraction of the pipe.

A train load of this pipe glistens in the sun like a lot of marble columns because of the care in manufacture and the clean aggregate used. The Lock Joint Pipe Company's Verdigris plant and methods present a fine sermon on not leaving anything to chance. Every detail of the pipe making and pipe laying has been worked out with minute care. The molds are made of steel and fit on cast iron bases. They are poured in a vertical position. Everything is standardized, and the utmost pains have been taken to insure the minimum of detail work.

The pipe is built to withstand varying pressures, all depending upon the part of the line in which it is to be used. The heads that have to be provided for range from 25 to 140 feet. At these pressures 27,000,000 gallons of water will pass through the pipe line daily.

Up to the present time the pipe-making and -laying departments have never been pushed hard enough to make it possible to state with certainty their maximum capacity, as their speed is limited by the rapidity with which the trenches can be prepared.

The Lock Joint Pipe Company began work on this contract on October 11, 1922, and the line is scheduled for completion on April 11, 1924. The total labor force now working on the contract is 430 men.

ACKNOWLEDGMENT.—Abstracted from *The American Bulletin*, by courtesy of the American Hoist and Derrick Company, St. Paul, Minn.



AN AMERICAN LOCOMOTIVE CRANE SETTING PIPE

How Air Helped Build a Kentucky Highway

By D. P. O'Rourke

Knoxville, Tenn.

THE accompanying illustration shows how Ping Brothers Construction Company put through its contract at Greensburg, Ky., on time, by depending on compressed air drills and a portable compressor to get rid of the rock on this highway job. Green County, in central Kentucky, let the contract early in the spring of 1923 to Ping Brothers for grading the 6 miles north of Greensburg on the road to Hodgenville. This highway, intersecting the Jackson Highway, will give Green County two outlets, the old one being via Campbellsville and Lebanon.

The job includes 15,000 cubic yards of rock excavation, the rock encountered being the ordinary limestone common to the central and blue grass section of Kentucky. The equipment employed for this part of the job consisted of a Sullivan hollow piston rotator operated by a

Class WK-34 Sullivan portable air compressor, driven by a belt from a Fordson tractor. The compressor is 8 by 8 inches in size, giving a displacement of 121 cubic feet of air at 100 pounds pressure. The tractor serves the double purpose of hauling the outfit from place to place and operating the compressor when drilling is to be done. The tractor is of course available for other hauling work when not occupied on this job. The country through which the road is being constructed is hilly, including a number of rock cuts, the maximum grade being 7 per cent. On one of the cuts on the outskirts of Greensburg, it was necessary to drill shallow holes and shoot lightly because of neighboring residences. On other parts of the work holes 10 and 12 feet were readily drilled with this outfit.



A SULLIVAN FORDSON-DRIVEN AIR COMPRESSOR, OPERATING A ROTATOR DRILL AT GREENSBURG, KY.

Copper-coated Shingles a Possibility

AMONG the possibilities resulting from a process for spraying metals which has been practically perfected in the United States Bureau of Standards, it will be possible to coat shingles with copper, thus making them fire-resisting and weather-proof, and giving them the usual artistic green copper color.

The essential of the process is that the metal is first vaporized and then sprayed onto the surface to be coated by means of a powerful blast which congeals it to the solid form as quickly as it strikes the surface. Details of the process are withheld by the Bureau at pres-

ent for military reasons, except for the statement that it is based on a new principle and that electricity is used in the vaporization process.

Experiments are already being made along the lines of copper-coating shingles and other roofing material and soldering metal to glass. A coating of copper 1/1000 of an inch in thickness may be applied at the rate of 2 square feet a minute at a cost of 2 cents a square foot, exclusive of the cost of labor. Cheaper and more easily fusible metals, such as lead, would cost less.

Long Haul Made Combination of Methods Economical on North Carolina Job

By R. P. Royer

Royer-Ferguson Company, Inc., Roanoke, Va.

WITH the only available shipping point one mile from the end of a concrete road job $10\frac{1}{2}$ miles in length, the haulage of materials assumes the utmost importance. These were the conditions confronting the Royer-Ferguson Company, Inc., contractor for North Carolina State Aid Project No. 533, which extends from High Point toward Winston-Salem. The method adopted was to haul preproportioned batches in steel boxes on motor trucks and trailers over as much of the concrete road as was opened to traffic, and then transfer the batch-boxes to industrial cars for transportation past the new pavement to the mixer.

Although the distance from High Point to Winston-Salem is approximately 22 miles, no railroad is near the highway at any place between the two cities. Materials for Project No. 533 were therefore received at a siding along the main line of the Southern Railway at High Point. Here a Brownhoist locomotive crane transferred sand and crushed stone to overhead loading bins fronting on the street, while cement was unloaded into the warehouse.

Contract for hauling batches from the plant to the transfer point was originally sublet on a ton-mile basis, but later the equipment was purchased and operated by the contractor. The equipment used consisted of $3\frac{1}{2}$ -ton Acme and Garford trucks with Troy trailers. Each truck



THE COMPLETED ROAD

carried three Lakewood steel batch boxes of the tip-over type, and pulled a trailer loaded with four more boxes. Each box contained materials for a four-sack batch of $1:1\frac{1}{2}:3$ concrete.

To avoid turning the trailer around, the truck-trailer unit ordinarily continued past the aggregate bins and drew up at the cement shed, where four bags of cement were placed in each batch-box on the truck. The truck was then uncoupled from the trailer and driven to the aggregate bins, where stone and sand were



THIS PNEUMATIC CRANE TRANSFERS THE BATCH BOXES FROM THE TRUCK TO THE TRAIN



STARTING ON THE LAST LAP OF THE 10½-MILE HAUL

added. Meanwhile cement had been placed in the batch-boxes carried by the trailer. The truck now backed up to the cement house, and was coupled to the other end of the trailer, which was then pulled up to receive the aggregates.

With paved streets and the concrete road to haul over, the trucks made good time en route to the transfer station, where they stopped under a light gantry crane which carried a

pneumatic hoist. The gantry spanned the concrete slab and the track of 24-inch gage along the shoulder. Lifting tongs suspended from the hoist were hooked into holes at the sides of the batch-boxes, and they were quickly lifted and moved sidewise to position over an industrial car truck. When enough boxes had been transferred to make up a train load, the cars were pulled to the mixer by a Burton gasoline locomotive. Eight cars, each carrying two boxes, was a standard train; on grades—and there were several ranging from 3 to 5 per cent—this number was cut to as low as five cars.

Although the plan adopted involved an additional handling of the batch-boxes, it utilized the concrete pavement as fast as opened to traffic, and has doubtless proved economical in this instance. John D. Waldrop, Greensboro, N. C., was District Engineer in charge of the work for the state, and J. W. Mills was Senior Resident Engineer. The North Carolina State Highway Commission is headed by Frank Page, Chairman, and Charles M. Upham, State Highway Engineer.

ACKNOWLEDGMENT.—Illustrations by courtesy of the Portland Cement Association.

Winter Excavation Near Toronto

Toronto Contractors Move 150,000 Cubic Yards of Material in Weather 20 Degrees Below Zero

AT Swansea, a suburb of Toronto, the F. W. Scriven Construction Company, of the Excelsior Life Building in that city, completed a contract entirely during the winter months in a manner which speaks well for the energy of the contractors. The work called for the filling in of a piece of ground the total area of which approximated 8 acres, necessitating the moving of upwards of 150,000 cubic yards. This ground consisted of a swamp and a steep hillside the character of which rendered it useless for building purposes.

When the Excelsior Land Company took hold of the property, they recognized its possibilities and determined to level it and make a valuable subdivision. Furthermore, they appreciated the value of doing this development work during the winter so that they would have the summer free for real estate work. The result was that this land which was of no value was transformed into a uniform plat of about 7 per cent grade with an average height of about 20 feet above Lake Ontario and with a value for industrial purposes said to be \$60 to \$80 per front foot.

The contract was let at the end of November, 1922, when actual freezing weather had already set in, and the first earth was moved on December 4 with a small Erie shovel loading wagons and trucks. Three weeks later an-

other small shovel was added, and a third was brought into action on January 1. This last machine was a 40-R Bucyrus with a 1½-yard dipper, the property of Johnson Brothers of Brantford, Ontario. The work consisted of cutting down the hill and filling in the lowland, the cut running up to a depth of 45 feet. By the first of January the Canadian winter had set in in earnest, the temperature frequently touching 20 below zero with a high wind—anything but conducive to outside construction work. The ground was frozen like rock. In spite of these conditions, the contractors determined they were not going to be "frozen out," and they went after the job with stumping powder and dynamite, of which they used over a ton.

Through January and February these operations continued, and on March 2 the Bucyrus was moved off with the heavy work disposed of. The two smaller machines finished cleaning up three weeks later, and on March 29 the F. W. Scriven Company turned over the property to the owners for subdivision work, completed except for a little blade grader work.

The engineer in charge of the work was H. P. Heywood, who represented the firm of James Proctor and Redfern, consulting engineers of Toronto.

ACKNOWLEDGMENT.—From the *Excavating Engineer*.

Old Automobile Tires Make Noiseless Grade Crossings

Rubber Block Paving in the United States and Great Britain

THE accompanying illustration shows the first section of rubber crossing laid for the Chicago, Milwaukee & St. Paul Railroad at its Main Street crossing in Racine, Wis. This crossing is laid in sections 4 feet wide by 5 feet long, and the rubber blocks, made by the Wright Rubber Products Company, Racine, Wis., are secured by both cement and wood screws by means of a patented lug to a foundation of 4- x 6-inch hardwood timbers. These are securely bolted together with several $\frac{1}{2}$ -inch bolts. The guard-rail is bolted on each side of the section, the rubber blocks coming up even with the top of the guard-rail. Each section is lag-screwed to the ties, so that in case of a split rail or a broken tie it is only necessary to remove six lag-screws with the socket wrench, and the section of the crossing can be pushed to one side and repairs made to the wooden ties.

This crossing of rubber blocks has been installed where the traffic is extremely heavy. Thousands of automobiles and trucks, as well as teams, cross it each day. The wooden crossing shown in the illustration was laid less than 60 days before the picture was taken and is shown completely loosened from the foundation. It is interesting to note the surprise of observers over the fact that the sharp calks of horses have no effect on the new rubber pavement. It is also interesting to note the noiselessness of a heavy truck when it hits the rubber paving. It is quite a contrast to the usual rattle when a loaded truck crosses.

These rubber bricks are made under hydraulic pressure of several thousand pounds to the square inch and are molded separately. The main ingredient is ground-up old automobile tires to which have been added other wear-resisting compounds upon which age has little or no effect. With the patented lugs it is possible to lay this pavement on top of a concrete base without fastening, inasmuch as the whole pavement is tied together by the interlocking lugs. On street paving, the curb lines would furnish the proper protection on the sides, and an iron beam could be put across, sunk in the concrete at reasonable distances, to take care of the danger of movement lengthwise of the street.



GRADE CROSSING IN RACINE, WIS., SHOWING SECTION PAVED WITH RUBBER BLOCKS

Old and New Rubber Road Experiments Abroad

According to *Roads and Road Construction*, London, England, Evan J. Edwards, in speaking on the subject of rubber roadways at a meeting of the Engineers' Club of London, referred to the potentialities of rubber for paving. The first rubber road ever constructed was invented by Morland M. Dessau. That was in 1913, when a portion of the road at the junction of the New and Old Kent Roads, Southwark, was laid with rubber. In this case, the method was to mount wood blocks with half an inch of pure plantation rubber. The war hindered experiments, but during the last two years much attention has been given to the question.

In addition to Mr. Dessau's method, several others have been adopted. Much interest has been shown in the rubber blocks laid around the Cenotaph in Whitehall, London. In this case, a smooth concrete surface was prepared, and on that hot pitch was sprayed just prior to the laying of the rubber. The rubber blocks were constructed with a groove on one side and a corresponding projection on the other, so that when laid the blocks were locked in position.

Rubber roads constructed by a different method have been laid in Glasgow and Edinburgh during the present year. In these cases a rubber block measuring $9 \times 4\frac{1}{2} \times 2$ inches was fixed by means of imbedded steel spikes into a concrete base block of slightly smaller dimensions. These blocks were laid on a prepared concrete foundation and were grouted in

with cement or pitch. It was recommended by the makers that these particular blocks should be laid when the concrete foundation of the road was set but still in a green condition, the surface of the concrete being smeared with a mixture of one part cement and three parts sand. While this was just damp, the rubber block with the under concrete base molded into it was set in position and then grouted in with cement. The whole was then allowed to set before traffic was permitted to pass over it. If that delay is not possible, the rubber blocks can be grouted into position with pitch or bitumen. The top surface of the blocks laid in Edinburgh and Glasgow contained 30 per cent of plantation rubber and no reclaimed material.

Mr. Edwards' personal opinion was that the

greatest point in rubber roadways would be proved to be ultimate economy, as it is the only road material which will absorb and distribute the weight of the traffic carried. Other materials, by their relative non-resilience, immediately transmit the load to the foundation of the road. Large slabs of rubber were laid a good many years ago at the entrance to St. Pancras and Euston railway stations, London, but, as these were under cover, the results obtained are not of very great use when considering ordinary roadways. Over 20 years ago a rubber road was laid in Princes Street, Edinburgh, and although it has been walked upon by many millions of people, it is found to have lost only a fraction of an inch in thickness during that period.

An Unusual Contract

BIDS were recently invited on the 6-mile Moffat tunnel in Colorado. The bids were to be on a unit price basis, but, owing to the nature of the job, no regular bids were received. An irregular bid was received, however, on a profit-sharing basis, naming a lump sum of \$6,075,000, which included \$486,000 profit. Immediately after the receipt of this bid several others on a similar basis were received, but none of them were considered.

The engineers then decided to invite bids on a rather unusual basis, but one which ultimately proved satisfactory and on which the contract was awarded. The proposal form prepared by the engineers named a preliminary lump sum bid of \$5,250,000, using the preliminary quantities as set out in the plans and specifications. The contractor was required to name unit prices which, when multiplied by these approximate quantities, would amount to \$5,250,000. The contractor also stated in the proposal a fixed fee for which he would execute the work if the cost was exactly this figure. He also stated a minimum fee which he would take for his work regardless of the cost.

The result of this contract will be as follows: If the work costs less than \$5,250,000, the savings will be shared equally with the contractor, in which case he will also get his fixed fee. Should the actual cost be more than \$5,250,000, 50 per cent of the extra cost will be deducted from the fixed fee until the fee is reduced to the minimum fee stated in the proposal.

Four bids were received on this basis. The successful bidder named a minimum fee of \$140,000.

This is an unusually fair proposition for both the owner and the contractor. The hazardous nature of the work necessitates that the contractor, if he is to bear the whole responsibility, must bid sufficiently high to cover all reasonable contingencies, but at the same time the owner would pay for the chance taken by the contractor whether anticipated conditions arose or not. As this contract is written, the owner is assuming the risk jointly with the contractor, but the latter is guaranteed in any event the fee for his services which he himself has stipulated.

—*The Scraper.*

The Traveling Salesman

THE wide-awake, progressive contractor who is looking for new ideas is always glad to meet salesmen for building supply firms and for contractors' equipment. While they take a little of the contractor's time they are as a class wide-awake and observant, and because they spend their entire time talking to contractors, architects or engineers, they pick up a good many valuable ideas which they are always ready to pass along. Ten minutes' talk with a salesman for such a firm may result in getting suggestions and information worth a great deal of money to the contractor. Commenting upon this, *The Western Canada Contractor and Builder* says:

"Try cultivating the traveling salesman who may call upon you. Look upon them as being in a position to give you good ideas and information. In the case of the traveler selling

equipment, ask him what other builders are using; ask their advice upon routing equipment so that it is always kept busy. Let them tell you all about their equipment, if only to get a line on it. See if they know what business-building plans other contractors are adopting.

"Ideas are priceless, and the traveling salesman is usually a splendid source for getting them. Among salesmen it is a generally accepted fact that the bigger the man the easier he is to talk to, for the really successful man is always anxious for and ready to receive new impressions and suggestions. Experience has shown him the value of an interchange of ideas.

"If the big men in the business feel this way about the traveling salesman, then no builder, no matter how small, can afford to ignore one of the sources of information that helped to make the big man what he is."

One Big Mixer Handles Large Building Job

St. Louis University Building Covering Two City Blocks Contains Over 4,500 Yards of Concrete

THE new St. Louis University Building, which was completed in November, has several points of considerable interest to building contractors. The entire job, which covers an area of 435 by 136 feet, or the equivalent of two city blocks, was poured with one 7-S Smith mixer. The building is a three-story structure, consisting of three floors and a concrete roof. In the 4,500 cubic yards of concrete which make up the concrete work of this building, 24,000 sacks of cement were used.

The floors are of 10-inch slab construction using 8-inch pans with a 2-inch top. The heavy concrete columns run through the entire building and have ample heavy concrete foundations.

For handling the concrete on the job, two chuting towers were erected, and the mixer moved from one tower to the other as required. The job was started early in 1923 and finished in November. In that length of time the mixer stopped just three times because of minor troubles, which were quickly fixed. The concrete crew handled as many as 54 bags an hour on the job, which the contractor considers an excellent performance.

The equipment for this job, which was handled by the F. Schirm Contracting Company, Inc., 4336 College Avenue, St. Louis, Mo., was sold by the George F. Smith Company, St. Louis, Mo.



THE COMPLETED ST. LOUIS UNIVERSITY BUILDING IN ST. LOUIS, MO.

What Is "Diligent and Continuous Prosecution of Work"?

A CONTRACT to lay tile required the work to be "prosecuted vigorously and continuously." The proper construction of this clause was the principal subject of controversy in the case of Dickey vs. Roswell Drainage District (292 Federal Reporter, 29). It was decided that the contract required completion of the work within a reasonable time, considering war conditions and difficulty in securing labor and materials, etc. It was also decided that where payments due the contractor were in arrears, insistence by the other party on continued performance waived prior delay in prosecuting the work. The following is an extract from the opinion:

"In such situation Dickey was only bound to complete the work in a reasonable time, the existing conditions, situation, and circumstances regarded. The agreement to prosecute the work vigorously and continuously is therefore to be interpreted in the light of the time contemplated for completion, to wit, a reasonable time, and he was required to exercise only such vigor

and continuousness of prosecution as would insure completion in such time, the situation, and existing conditions regarded. The work was in hand during the Great War, and it was being prosecuted before, during, and after this country became involved in that war. The evidence discloses a great scarcity of labor, great incompetency of the laborers secured, and great difficulties in procuring materials for the work and parts for repairs to machinery.

"If there had been, as there was not, a fixed and definite time agreed on for completion, and no exceptions written into the contract for delays incident to circumstances, then, of course, the scarcity of labor and the incompetency thereof, and the difficulty of getting materials and repairs, would have afforded no legal excuse for a failure to complete within the period provided. But when, by implication of law, completion is required only in a reasonable time, that time which is reasonable will be determined by a reference to the situation existing at and pending performance."

The Construction of a Storage Dam Near New Canaan, Conn.

Heavy Work Done by Small Revolving Shovels in Hard-Pan and Boulders on Dam for the Stamford Water Company

ON the Mill River near New Canaan, Conn., Henry Steers, Inc., contractors, New York City, are engaged in the construction of a storage dam and reservoir for the Stamford Water Company, Stamford, Conn., for the city water-supply. On this job a $\frac{3}{4}$ -yard revolving shovel is tackling hard-pan and boulders under the most difficult conditions. The dam will require the excavation of 70,000 cubic yards of material and is to be of concrete with gravity section 50 feet high and 2,000 feet long and will contain 60,000 cubic yards of concrete. The reservoir itself will cover about 300 acres. The excavation operations call for a cut 25 feet wide on the bottom and 30 feet deep along the base of the dam. This cut is down to bed-rock and is through hard-pan and boulders. Gravel for concrete is obtained from a borrow-pit near the site.

The shovel equipment consists of two $\frac{3}{4}$ -yard revolving shovels, a Bucyrus 14-B and a Bucyrus 20-B, both having continuous traction treads. The 14-B is being used at present in the gravel-pit, and the 20-B in the hard digging in the cut. The last-named shovel has been up against some pretty tough digging for the last seven months. As we are all aware, geologists' opinions to the contrary, the only difference between solid rock and hard-pan is mental, with all records in favor of hard-pan for meanness. Then stud this hard-pan with boulders weighing from 5 to 5,000 pounds each,

and you will have some idea of what this small shovel has gone through. The digging, furthermore, was not all on firm ground, as the traction mountings have been obliged to undergo the wear and tear of plowing through mud and water which had accumulated in the pit, sometimes covering the treads. It has also been forced to climb in and out of cuts on grades which appear to be at least 30 per cent and steeper.

The boulders range in size from $\frac{3}{4}$ -yard to 2 yards or more. One in particular was measured and found to be 4 by 4 by 5 feet approximately and two others $3\frac{1}{2}$ by 5 by 5 feet, all of which, the operators state, were nosed out and placed to one side with the shovel. The hard-pan ran on an average from 6 to 8 feet in depth and in some places as deep as 10 feet. This hard-pan, as stated, was filled with boulders of all sizes. Test drillings had reported this to be solid rock. All of this material the little shovel was obliged to tackle without the use of powder, as the structure of the dam would not permit its use.

This work was at the start considered entirely too severe for a shovel of this size, but, according to David Bonner, the Superintendent, and W. J. Fitzpatrick, the General Superintendent of the work, the shovel thus far after seven months of pounding has come through with a clean slate, as no time has been wasted and none spent on repairs.



BUILDING THE STORAGE DAM AT NEW CANAAN, CONN.

In the foreground may be seen a Bucyrus 20-B excavating for the foundations. It loads into skips which are handled by the traveling derrick with 26-foot centers, at the left



DAM IN COURSE OF CONSTRUCTION, SHOWING TRESTLE, TRAVELING DERRICK AND FORMS IN PLACE

The Conveying System

On the foundation excavation the material has been taken from the shovels by skips handled by traveling derricks with a gage of 25 feet. This material is being cast to one side, but will be thrown against the back of the concrete wall of the dam, when that is finished, by means of orange-peel buckets handled by the derrick.

In the gravel-pit the shovel loads the material through a hopper onto a 20-inch conveyor belt 600 feet long between centers. It is then passed through a No. 6 Traylor jaw crusher and conveyed to a screen containing $\frac{1}{4}$ -inch perforations. The material passed by

this screen is taken on a belt to a storage pile. The oversize is deposited near-by, by another belt. Under these storage piles is a tunnel in which two 20-inch belts operate to convey the sand and stone to the mixing bin. Another 20-inch belt is used to take the cement from the storage shed to a Smith mixer, from which it is elevated by an Insley tower and conveyed by still another belt to the forms. This conveying system was designed by Harry R. Wheeler, engineer for Henry Steers, Inc. To make the system even more complete, the contractors generate their own electricity for the many motors necessary to keep the plant in operation.



A CLOSER VIEW OF OPERATIONS AT NEW CANAAN

Large Bridge Moved Eight Feet Without Stopping Traffic

By Jack Barrett

ENGINEERS have successfully moved an 800-foot span of the Omaha-Council Bluffs bridge, a distance of 8 feet, while street cars and automobiles streamed over the structure without a moment's interruption. This portion of the bridge weighs over 4,000 tons.

Crews, under the direction of P. P. Angier, in charge of the widening of the bridge for the Mount Vernon Bridge Company, Mount Vernon, Ohio, working in conjunction with crews of the Omaha and Council Bluffs Street Railway Company, under the direction of R. A. Leussler, General Manager, accomplished the singular job between 9:20 a. m. August 24 and 11 a. m. August 25.

Four 50-ton jacks were employed to raise each of the twelve supporting columns of the segment and place them on a number of greased rails. Two 10-ton jacks were then fixed into the earth and placed against the sides of each column near its base. Crews worked simultaneously at each of the twelve columns. Six men at each column alternately worked the jacks and knocked at the base of the columns with heavy steel rails. An engineer went from

one column to another, keeping accurate and precise tab on the progress of each column. About every 15 inches all twelve columns were re-aligned and then the slow progress was resumed again. In this manner the whole 800-foot section was moved bodily without interfering with traffic, which is unusually heavy here, owing to the fact that this is the only traffic bridge connecting the two cities.

A special section of portable street-car track was used at each end of the span, where the severed section and stationary sections of the bridge met. This arrangement permitted the street cars to pass over the bridge while the actual moving was going on. The work of moving the portable tracks and trolley wires and handling the traffic was done by the Department of Track and Roadway of the Omaha & Council Bluffs Street Railway Company.

The bridge is being widened 16 feet. It was necessary to move the 800-foot span because of the city of Omaha requirement that the enlarged structure should be in the center of the street.

—The Improvement Bulletin.

How Do You Measure Materials?

It Is Well to Check Up on Your Foremen to Prevent Trouble

THE "practical" man, long experienced in concrete work, has a tendency to think disparagingly of theoretical and too refined methods in mixing concrete. Without doubt, theory can be carried too far. The present-day tendency is toward more careful control of concrete mixing, and there is no question but that a little extra care will be well repaid. Take, for example, the matter of measuring the various ingredients in a batch of concrete. Most of the measuring is done by wheelbarrows, and yet very rarely does the man in charge know the capacity of the wheelbarrows he is using.

In a recent case, a concreting foreman stated that he was using a good, rich mix—1:2:4. On further questioning, it developed that he was using one bag of cement to one wheelbarrow of sand and two wheelbarrows of stone. The barrows were of the deep, steel-body type, and

by actual measurement held three cubic feet. Thus, his mix was actually 1:3:6—a very much leaner mixture than he should have been using.

If measuring must be done by wheelbarrows, their capacity should be measured and a mark made to which they should be filled. A convenient way of doing this is to use the familiar bottomless measuring box, a table for which is given below:

DIMENSIONS FOR BOTTOMLESS MEASURING BOXES OF VARIOUS CAPACITIES

Capacity in Cu. Ft.	Length Inches	Inside Measure Breadth Inches	Height Inches
1 cu. ft.	12	12	12
1½ cu. ft.	15	15	9½
1½ cu. ft.	15	15	11½
1¾ cu. ft.	15	15	13½
2 cu. ft.	18	18	10½
2½ cu. ft.	18	18	12
2½ cu. ft.	18	18	13¾
2¾ cu. ft.	18	18	14½
3 cu. ft.	18	18	16

The Cost of Excavation by Draglines

Project	Cu. Yds.	Unit Cost
Shoshone	836,800	\$0.110
No. Platte	522,085	0.121
Newlands	1,706,810	0.091
Rio Grande	1,770,605	0.072

Dragline Machines Used

3 Bucyrus 9½ elec.; 1 Bucyrus 9½ gas; 1 Bucyrus 14 gas; 2 Pawling & Harnischfeger 206 gas.
2 Monighan 1T gas; 1 Bucyrus 9½ elec.; 1 Bucyrus 14 gas; 1 Pawling & Harnischfeger 206 gas.
2 Bucyrus 14 gas; 1 Pawling & Harnischfeger 208 gas; 1 Austin 4 gas; 3 Monighan 1T gas.
5 Bucyrus 9½ gas; 1 Monighan 2T gas; 3 Pawling & Harnischfeger 206 gas; 1 Bucyrus 30B gas.

NOTE.—1922 Projects, U. S. Reclamation Service.

Manufacturers ---- Distributors ---- Consumers

Published under the auspices of the Associated Equipment
Distributors, Sixteenth Street Viaduct, Milwaukee, Wisconsin

An Improved Catalog Service for Distributors of Contractors' Equipment

A GENERAL catalog showing the various lines of construction equipment of leading manufacturers would be of important value to every contractor for his constant authoritative reference. The average distributor of contractors' machinery could scarcely afford to expend each year the large sum that would be necessary to publish an adequately representative catalog of this nature. Such a catalog must be an annual publication, inasmuch as progress soon antiquates it through the radical improvements which increase the efficiency and change the designs of equipment of interest to the progressive contractor.

Through the Associated Equipment Distributors a plan has been carefully formulated whereby each year a very complete loose-leaf general catalog properly indexed will be placed in the hands of the contractors. Within this volume will be reproduced a very complete set of data on the principal lines of construction equipment and tools. To do this each manufacturer is asked to furnish his distributors annually with a certain number of printed pages of a standard size, illustrating and describing in brief form the manufacturer's products. Each distributor will assemble these pages received from the manufacturers he represents, bind them in a substantial volume at his own expense, index them and mail them to the contracting trade without cost. The result will be that every interested contractor will have at his command a complete review of the most important models of machinery or implements used in his business.

If two or more distributors are active in any contractor's territory, the contractor will be able to have a series of these volumes representing different makes of similar machines. Thus, the selection of needed articles can be accomplished easily and preliminary comparisons made with other distributors' equipment. Orders can be placed intelligently or inquiries invited understandingly.

It is the consensus of opinion of the distributors who have made searching investigations that the contractor wants such a volume, will use it and will benefit by it. Whether the contractor is interested in broadsides and circulars, they are difficult to file or classify satisfactorily and if not of interest at the moment are often tossed into the waste basket. It is hoped that the major portion of more influential manufacturers will agree to this plan and do their share toward promoting its success, which

ultimately will be of tremendous benefit to the entire contracting industry and will open a new field of standardization and efficiency in catalog publication. In order to present the foregoing plan from the distributor's angle based on his experience, we are dividing the statement under the following headings:

How It Will Help the Distributor
How It Will Benefit the Contractor
How It Will Assist the Manufacturer

How It Will Help the Distributor

This proposition will enable the distributor to publish a yearly catalog at a fair, reasonable expense to himself.

It will give him confidence that his product is constantly being brought to the attention of the contractor and will thus be helpful to his trade.

It will enable telephone inquiries to be discussed intelligently by catalog reference.

It will give his salesmen a good, practical working volume with data sheets inserted for their own use.

It will increase the sales of highly important labor-saving appliances through the contractor's being able to visualize his entire line, instead of only one or two commodities as is the case when circulars are used.

It will add prestige to every organization and will offer mental encouragement to distributors to improve and expand.

It will provide better, more complete presentation of the distributor's entire line at less expense.

How It Will Benefit the Contractor

The planning of equipment for a job will be facilitated by quick reference and comparisons of hundreds of different machines and methods.

It will be a distinct benefit in having under one cover complete and authentic information on allied equipment and tools.

It will save the contractor large sums through pictorial suggestions of ways and means of saving labor through the use of proper equipment of which the contractor might not know.

The contractor will be enabled to make intelligent comparisons of different models through reference to competitive distributors' catalogs.

It will make possible close estimating on equipment costs.

The pages will contain photographs of installations which will give sound ideas to work upon.

It will give the contractor a complete index of the local representatives of the various equipment manufacturers.

It will provide a condensed up-to-date reference file of essential information which can always be supplemented by complete details from the distributor.

If the contractor simply wants general information, he can always get it quickly without making an inquiry that would make him subject to salesmen's calls at a time when he is not in the market.

It will prevent misunderstanding over telephone inquiries or orders.

It will keep the contractor in constant touch with yearly developments and improvements.

The volume can be filed permanently, eliminating the necessity of keeping track of miscellaneous circulars.

The contractor will be given the result of careful choosing and elimination by the distributor, thus lessening confusion and chances of errors in selection.

Competitive distortion of facts will be prevented in regard to plant equipment where the purchase is competitive.

Such a catalog will offer numerous opportunities for study at leisure moments, enabling the contractor to become more familiar with the equipment in general.

It will keep the contractor in touch with the advances made by manufacturers toward STANDARDIZATION and improved design.

How It Will Assist the Manufacturer

The manufacturer will know that practically every worth-while contractor in the territory

covered by his distributors is receiving a general catalog including his line.

It will place up-to-date, authoritative information about his products in the file of every contractor under his distributor's name and among other allied but non-competitive products.

The catalog will gain the attention of thousands of contractors who might not read advertisements and who rarely give close attention to broadsides of printed matter, which mostly find their way into the scrap basket.

At a minimum of expense the manufacturer will be able to place his product before the leading contractors of the United States, thus capitalizing on the up-to-date complete mailing lists of the distributors' organization.

It will prevent obsolete bound catalogs or circulars from injuring his prestige by misrepresenting his present improved product.

It will prevent competitive distortion.

It will give each manufacturer the knowledge that a catalog containing illustrations of his product will be inspected several times each year.

He will have the knowledge that he is bearing his fair share or proportional expense not only in promoting his own products but in assisting in a plan of standardization, and is being a big factor in assisting his distributor and the contracting organization as a whole to a more stable position.

There is no scheme of direct advertising that can in any way approach or equal the opportunities this plan offers for direct, constant and successful publicity.

It will provide a "silent salesman" that will always be waiting in the customer's private office and that will be included in any equipment purchase conference of contractors at the psychological time.

Annual Meeting of the Associated Equipment Distributors

THE Fifth Annual Meeting of the Associated Equipment Distributors will be held on January 11, 1924, at the Milwaukee Athletic Club, Milwaukee, Wis. The closed session of the meeting will open at 10 o'clock Friday, and the open session, to which all manufacturers of construction equipment are most cordially invited, will be opened formally at 10 o'clock Saturday evening with a banquet at the Milwaukee Athletic Club.

At the closed meeting of the Association, many important subjects will be brought up for discussion relating to the progress and betterment of the distributors' activities, including sales, repairs, rental of equipment, advertising, territorial limitations, standardization, service and trade-ins.

The manufacturers' open session will be of great interest to every manufacturer of construction equipment, offering them an oppor-

tunity to personally meet the executives of the Associated Equipment Distributors and to discuss important matters concerning their joint interests and those of the contractor. The subjects that have been selected for addresses are chosen because of their important relation to the growth and expansion of the industry. It is hoped that this meeting will be the means of laying the foundation for more consistent progress and better understanding and appreciation of mutual problems.

There will be special addresses by prominent manufacturers on issues of importance, and the view-point of the distributor and the contractor on the same subjects will also be presented. It is anticipated that this meeting will be not only a success as a business and social opportunity to meet and confer, but will enable every one present to carry away with him the constructive message that will be of value.

Concrete Mixer Mounted on Truck Saves 25 Per Cent in Labor Costs

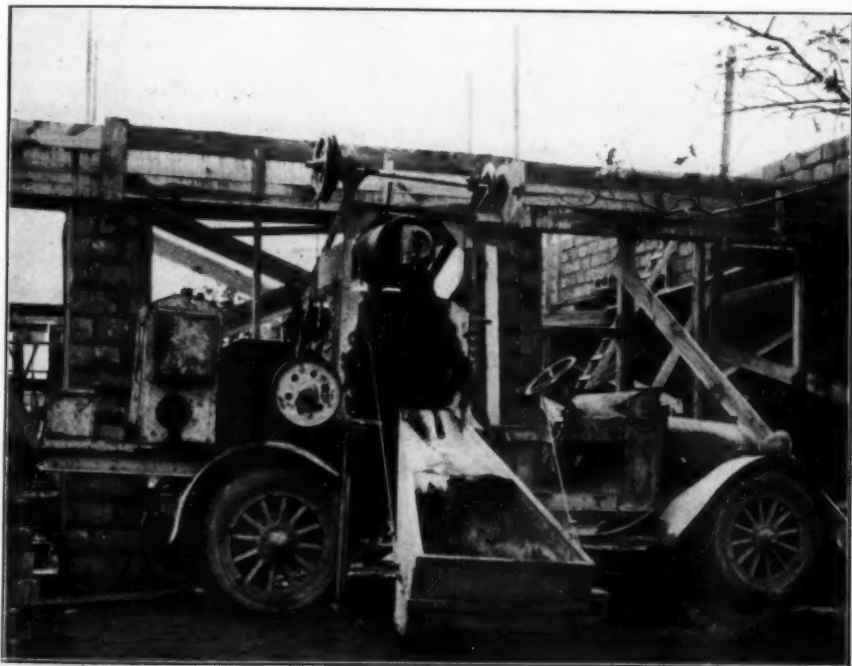
A Valuable Tip for Contractors Who Must Move Mixers Quickly

THE experience of George Leavens of Lansing, Mich., who has been able to effect savings of approximately 25 per cent in labor and even greater amounts in time by the use of a concrete mixer mounted on a Reo truck, will be of interest to many contractors. Credit for rigging up the outfit belongs entirely to Mr. Leavens. The practicability of the plant came to him almost simultaneously with the idea itself, and without hesitation he assembled the apparatus and put it to work.

He mounted a 10-foot mixer, which is one size larger than the average machine used by contractors on light work, on a Reo Speed Wagon chassis. His knowledge of gasoline engines warned him that it would be far from economical to attempt to run the mixer from the 45-horse-power engine of the truck when a 6-horse-power gasoline engine would furnish ample power for the work. Using the truck engine for this work would also have meant wear and tear on transmission parts, which

might have decreased the life of the chassis by a couple of years. For these reasons the 6-horse-power engine was mounted at the rear of the mixer, and it is now operating it very satisfactorily.

The considerable saving in labor through the use of the mounted mixer is due to the elimination of a lot of handling of the concrete after it is mixed. For instance, in pouring concrete for a sidewalk, the Speed Wagon is driven parallel to the sidewalk, pouring as it moves along. The same system is employed in pouring outside foundation walls, and in pouring inside walls the truck is driven as close as possible to the point and much wheeling is thus saved. Perhaps the greatest saving in time occurs when one job is finished and the outfit must be moved to another. The jobs are seldom less than a mile apart and are often two or three times this distance from each other. With the mixer mounted in this way, the plant shifts are made in a minimum length of time.



BY MOUNTING HIS CONCRETE MIXER ON A REO CHASSIS THE CONTRACTOR HAS MADE IT POSSIBLE TO HANDLE MORE WORK WITH GREATER EASE

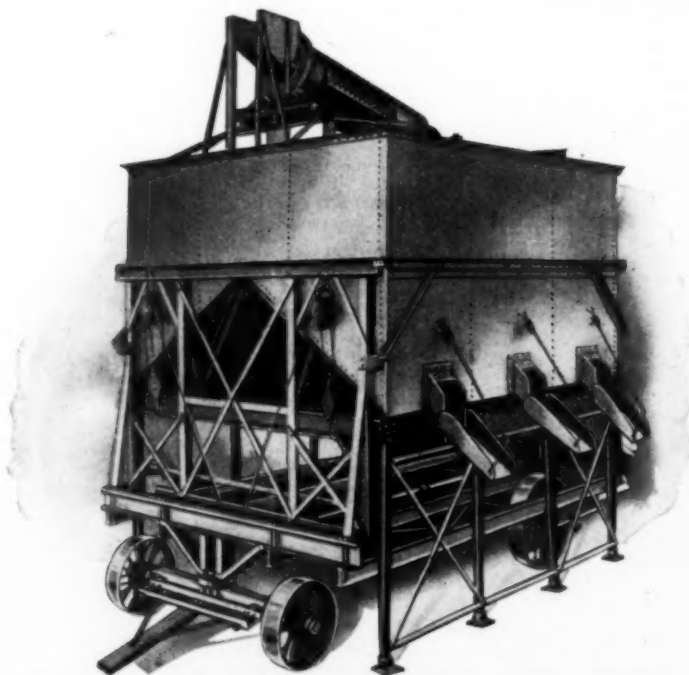
From Rock to Road

Sturdy Crushers, Elevators, Screens and Storage Bins Necessary for Securing Satisfactory Road Materials

GOOD roads demand the use of a properly crushed hard stone that has been graded and made available for immediate use through storage bins.

In order to have a crusher which will properly handle and crush rock without undue expense for up-keep, it is necessary that the machine be heavily built. The wearing parts of the United crusher, made by the United Iron Works, Kansas City, Mo., are of a special semi-steel mixture the wearing quali-

avoids a disastrous wreck of the crusher, as this part can be replaced at an expense of only a few dollars. If another bracket is not on hand, a block of wood with a hole bored through it for the wedge bolt will serve the purpose until another casting is received. These crushers may be mounted on gooseneck trucks, permitting the turning of sharp corners or the complete turning of the machine within a small circle. The crushers are all mounted on a subbase of timber securely framed and rodded.



PORTABLE STORAGE BIN RAISED TO FULL HEIGHT, WITH CHUTES EXTENDED FOR FILLING TRUCKS

ties of which approach that of steel at only a small portion of the cost. The parts are interchangeable and the crusher is designed so as to minimize the possibility of breakdowns, but accidents will occur and parts do wear out in time. Therefore, the parts carried in stock for immediate shipment will materially increase the value of this machine, as it minimizes shut-downs.

The wedge bolt bracket of the crusher is designed to give way first should an unbreakable object get into the machine by accident. This

This brings the mouth of the crusher to a convenient height for handling the rock direct from the wagon or from the feeding platform. A belt conveyor attachment carries the crushed rock to the rear, where it is permitted to discharge either directly to the road-bed or to wheelbarrows. It may be arranged to discharge into an elevator which will raise the crushed stone to a screen which discharges into a steel storage bin.

Storage bins such as those illustrated should be of ample size to permit the continuous opera-

tion of the plant. If the bin is not used, it is necessary always to have a continuous line of wagons to receive the crushed product or else permit it to be discharged upon the ground, thus requiring additional shoveling.

The truck used on the portable bin is of the same sturdy construction as on the crusher unit, excepting that the gooseneck feature is not required. The bin is of the telescope type, per-

mitting it to be lowered when ready to be moved.

In the raised position in which the bin can be placed in only a few minutes, the bin serves to load six wagons promptly through the discharge chutes. The spouts are so designed as to act as gates when raised and secured by chains. This type of bin is constructed entirely of steel and is practically indestructible.

Recovering Brass Well Screens

Unique Method Makes Recovery of Well-built Screens Quite Easy

ACCORDING to those who have made a life study of the installation and recovery of brass well screens, there is only one safe and sure method of recovering them. Edward E. Johnson, Inc., St. Paul, Minn., manufacturers of Johnson brass well screens, have outlined the method, including the necessary equipment, for the benefit of those who have not had as much experience. They have on file cases where Johnson screens 18 inches in diameter and 30 feet long have been recovered and reset as many as five times. The method by which screens are pulled requires the use of a derrick or tripod, a string of pipe, the



PREPARING THE SACK

outside diameter of which is at least 2 inches less than the inside diameter of the screen, a coupling for the bottom of the pipe, a gunny sack, sand, pipe clamps and pulling jacks.

The coupling is attached to the bottom of the pipe and then the sack is slipped over the end of the pipe and tied securely above the coupling on the bottom. The sack is opened at the bottom and cut into 3-inch ribbons lengthwise. The ends of these ribbons are tied around the pipe a sack length above the coupling. This length of pipe is then lowered to the bottom of the screen, adding as many sections of pipe as are necessary. The space between the pipe and the screen is filled with sand. If the screen is more than one section in length, it is advisable to tamp the sand



PUTTING IN THE SAND

around the joints. The clamp is placed on the upper end of the pipe, the jacks are placed under the clamp, and the pipe is pulled, finishing with a cable when the screen is loose. A stream of water is used to wash the sand from between the pulling pipe and the screen after it is out of the well.



PULLING OUT THE SCREEN

These three illustrations are prepared from clippings of a moving picture film showing all of the operations in the installation and pulling of Johnson well screens

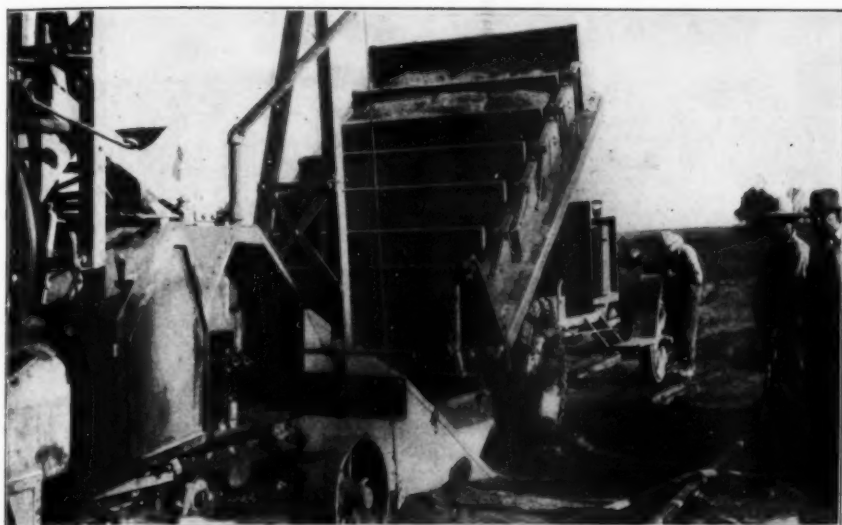
Contractor's Equipment at Work



TWO IROQUOIS 8-TON ROLLERS AT WORK ON ASPHALT PAVEMENT, MIDAN SOLIMAN PASHA, CAIRO, EGYPT, IN JULY, 1923



FORD TRUCK OWNED BY BUILDING CONTRACTOR OPERATING IN THE MIDST OF CONSTRUCTION OPERATIONS



GMC TRUCK WITH SEPARATE BATCH COMPARTMENTS, OWNED BY McCLINTOCK, COLWELL & GORDY, SYRACUSE, IND., DUMPING ITS LOAD INTO A CONCRETE MIXER

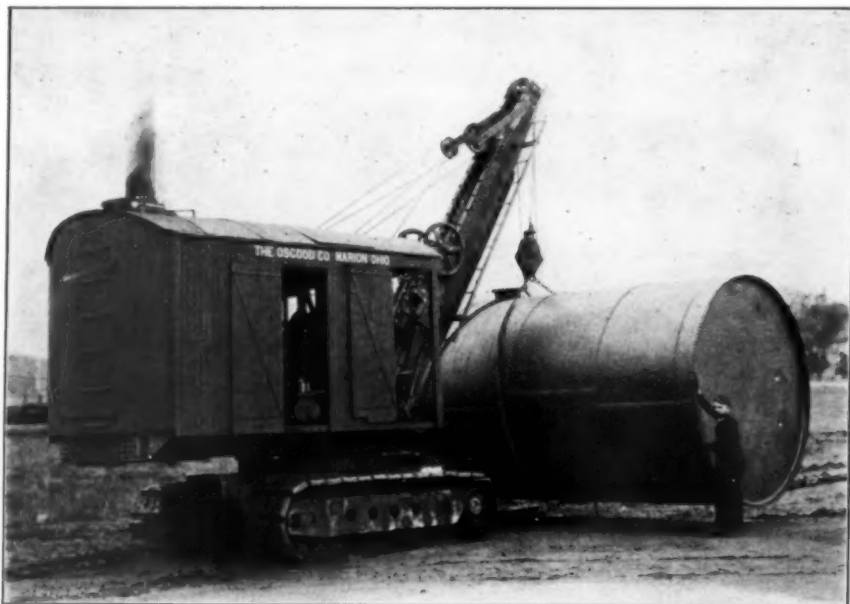


MACK TRUCK EQUIPPED WITH HEIL HIGH HOIST BEING LOADED WITH GRAVEL BY BROWNHOIST TRACTION TREAD CRANE



A PACKARD 5-TON DUMP-TRUCK OWNED BY CUNNINGHAM BROTHERS, CONTRACTORS, MERION, PA.

The original equipment of two 3-ton and two 5-ton Packard dump-trucks owned by this company, has been supplemented by 22 additional 3-ton and 5-ton Packard trucks



AN OSGOOD-29 MOVING A 15,000-GALLON STEEL STORAGE TANK

The installation of a 15,000-gallon steel storage tank a quarter of a mile from the railroad was facilitated by the Osgood-29 shown in the illustration. The size of the tank prohibited ordinary hauling, as it weighed more than $5\frac{1}{2}$ tons, was 25 feet long and 9 feet in diameter. The dipper and dipper handle of the steam shovel were removed and a chain cradle placed around the tank and made fast to the sheave blocks. The steam shovel lifted the tank clear of the ground and with a man walking at either side of the tank to prevent undue swinging, it was carried across a field about a quarter of a mile and placed in a 12-foot excavation. The entire operation required less than one hour. The continuous treads on the shovel made movement across lots possible with a considerable saving in time

A New 2-Horse-Power Gasoline Engine

THE new 2-horse-power size recently added to the Hercules line of gasoline engines made by the Hercules Corporation, Evansville, Ind., is said to have met a specific demand from the contracting industry. While the Hercules 1½-horse-power engine had continually proved that it would exceed its rated horsepower by at least 10 per cent, there was still a gap between it and the 3-horse-power size. There are a number of machines being marketed to-day in the contracting field for which the new 2-horse-power engine is well adapted.

In common with the rest of the Hercules family, the 2-horse-power engine has high-pressure bearings, extra heavy fly-wheel, and the Wico high-tension magneto.



A NEW HELPER FOR THE CONTRACTOR

Illogical Scrambling for Jobs

Haggling and Price-Cutting Are Not the Proper Way to Secure Jobs

UNDER the heading, "Plain Words About Bidding," the *American Contractor* discusses editorially the custom of awarding contracts to "the lowest responsible bidder" or "the lowest and best bidder." The writer had in mind building construction, but what he says is just as applicable to the construction of public works and other engineering structures.

"When will the building trades adopt modern American business methods, and discard a system that is obsolete everywhere but in the Orient? Armenia, Turkey and Greece still stick to the old system of barter, each side striving to take advantage of the other fellow, but so-called civilized nations have outgrown these childish customs, except in the building trades.

"Business men in America used to follow this same procedure. Wanamaker was the first to abandon it. He marked his goods in plain figures, and many a confirmed bargain-hunter felt deeply aggrieved because no amount of haggling would alter that price. To-day, all lines of business are handled on a fair price basis. That is to say, all but the contracting business.

"If a banker wants a new suit of clothes, he goes to his tailor, finds what he must pay, and either closes the deal or decides that his last year's outfit will have to go through another season. But if he wants a new building, he resorts to Armenian tactics. A lot of contractors are called in, each one of whom is supposed to hammer down the price so as to bid below his competitors. Finally, one of them gets the job. He may make a profit and

he may not. No one knows until the job is finished, and some do not know even then.

"Contractors themselves have so hallowed this custom that all government work, whether city, county, state or federal, must by law be awarded in this manner to 'the lowest responsible bidder.' And those in charge usually forget all about that word 'responsible.' If bids are too close together, meaning that each contractor knew something about the work, but indicating to the lay mind that there had been collusion, there is usually an investigation by a grand jury. And if a job is awarded on a basis which is sure to yield the builder a fair profit over and above his actual cost, and books are kept so that everyone can see just what was the cost and what the profit, then someone will be indicted for fraud by the Department of Justice.

"The workers, seeing that this Armenian system is regarded as sacrosanct by their employers, immediately start in to trade in the same manner. They agree to do a certain job for a certain sum, but this agreement is subject to continual haggling, eternal squabbling, and to amendment—upwards—at every opportunity. Just like buying rugs in Constantinople.

"You would not dream of calling in all the surgeons in the city and telling them that the man who submitted the lowest estimate would be allowed to make test borings in your interior. Anyone would be crazy who would engage an attorney on no other recommendations than that he was cheap. Then why do contractors scramble for their business in this illogical way?"

Full-Crawler Treads for Fordson Tractors

Traction of Well-known Tractor Increased by Steel Tracks of Special Design

IT is now possible to secure equipment which will give the Fordson tractor a traction tread similar to that used by the larger tractor units. The Full-Crawler tread, made by the Full-Crawler Company, 500 Clinton Street, Milwaukee, Wis., is a combination of steel frame, sprockets and tracks that, when substituted for the four round wheels of the Fordson tractor, converts it into a crawler tractor. It has wide steel tracks of special ground-gripping design made so as to give the tractor plenty of traction in any kind of soil or surface conditions.



FULL-CRAWLER FORDSON TRACTOR HAULING ROOTER FLOW IN BREAKING UP OLD MACADAM ROAD

equipped, the Fordson can be used in deep mud, on ice, snow, swampy lands or soft soil or on hard roads. The tread is distributed over a large area, so that it does not pack the soil. The surface pressure is only $3\frac{3}{4}$ pounds per square inch, which is less than that of a human being. Giving extra traction to the Fordson means that the power developed by the engine can be utilized to better advantage. The draw-bar pull is also greatly increased and there is no slipping, thus eliminating all loss of power.



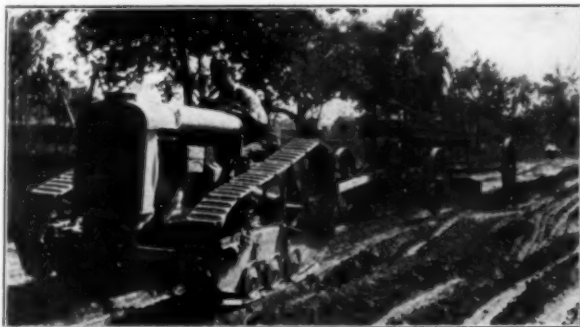
FORDSON WITH FULL-CRAWLER TRACTION HAULING ONE-HALF-YARD TWO-WHEEL SCRAPER

The tracks are made of high-quality electric alloy steel.

The equipment is steered by means of brakes on the rear sprocket. These brakes are connected to the regular steering hand wheel, so that a slight turn of the wheel to either side, as in ordinary steering, locks the brake on the inside of the turn, at the same time allowing the track on the outside to run freely. This means turning in a very short radius; in fact, the tractor will turn around in its own length.

This equipment also adds weight to the tractor, the weight being carried low and well forward, giving it a better balance. Thus

horses and still be economical in fuel and oil consumption, and to maneuver in a small space



FORDSON TRACTOR EQUIPPED WITH CRAWLER TREAD HAULING AN 8-FOOT BLADE GRADER ON BLUE MOUND ROAD, WISCONSIN STATE HIGHWAY NO. 19

and be repaired quickly and at low cost. The Fordson equipped with the Full-Crawler tread is claimed to fulfill all the necessary requirements for a contractor's small tractor. It does not and cannot compete with the 5- and 10-ton tractors.

Where mud is very deep and the ground very soft or in ice and snow, there are detachable grousers which can be put onto the crawler treads. These are sharpened steel plates, one of which bolts on to each track shoe, making a total of 38 for the machine. They sink into the ground about 2 inches below the track itself, thus insuring plenty of traction under the poorest operating conditions. With these grousers, the tractor, weighing 4,000 pounds, can go anywhere that horses can go, as far as traction is concerned. The grousers do not slow up the speed of the tractor, as they are

made at such an angle that they take hold of the ground and pull out easily when the track lifts.

Equipped with the regular round wheel, the Fordson tractor will travel from 8 to 12 miles an hour in high speed, and inasmuch as no reduction gears are put on the full crawler, the speeds of the Fordson thus equipped are about the same as those of the regular machine. This makes it possible to cover about twice as much ground a day as is possible with a team of horses. To install the Full-Crawler traction on a Fordson, no changes are made in the tractor and no special machine work or drilling of holes is necessary. The operation consists of removing the front and rear wheels of the tractor and substituting the crawler, which can be done by two good mechanics in five or six hours.

Brief Facts About Percussive Rock Drills

The Tripod Drill—an Old Stand-by for Contracting Operations in Rock

THE percussive rock drill used with steam or air has become absolutely indispensable to modern civilization. Road building, quarrying, reservoir construction and work in granite could not be carried on without this type of drill. It has made possible feats in engineering that would have staggered the imagination less than one hundred years ago. Already the rock drill has been improved greatly from the clumsy affair that was used on the Hoosac Tunnel, until to-day it is made reasonably light, very strong and durable.

The Wood rock drill made by the Wood Drill Works, 30-36 Dale Avenue, Paterson, N. J., has a number of important improvements which increase its durability and service. The material of the cylinder chest and air head has been changed from cast iron to vanadium tungsten iron, the new alloy metal. Metallurgists are unanimous as to the enormous strength of vanadium tungsten iron. It has a tensile strength of 45,000 pounds, while that of ordinary cast iron is only 18,000 pounds. Instead of crystallizing under friction, it actually hardens, and it is at least 100 per cent stronger than ordinary iron used in cylinders. It is as close-grained as silver, while cast iron is porous, and it is so hard that it is difficult to cut it with a file. The front head of the Wood rock drill is made of malleable iron held firmly by four bolts instead of two, and the screws holding the head together are of special make with nut-size heads and are electrically welded, making them 30 per cent stronger than the ordinary screws. The malleable iron washer which fits into the sleeve in combination with the four grooves in the spring nuts, effectively prevents the nuts from unscrewing and falling off. The packing sleeve is made of hard bronze and can be cheaply replaced when worn out, thus doing away with the expense of a new front head.

The air head is claimed to prevent leakage

until the packing is entirely worn out. The packing should fit tight around the piston rod and yet stand about $\frac{1}{8}$ -inch apart. By placing the openings one-third of the circle from each other no air can leak through. When the rings fit tight at the openings by reason of wear, it is only necessary to cut them to make them stand $\frac{1}{8}$ -inch apart, and the packing can be completely worn out before any leakage takes place.



ROCK DRILL MOUNTED ON TRIPOD

The rotating device is made of steel throughout. The spiral bar is made of one solid casting, and the teeth are strong enough to withstand the full power of the drill. The pawl holder is made of one solid forging and not of a welded collar. The top head is made of malleable iron and is bored at the back to receive the steel feed nut. The coil springs resting on the wrought-iron cross-piece receive the shock when the piston strikes the front head. These springs are said not to break or wear out and are claimed to retain their elasticity indefinitely. The valve is made of tool steel, moving automatically, and has no mechanical connection with the piston whatever, thus giving the piston a variable stroke. As the end spools of the valve never cross a port, this type does not freeze when operated by compressed air under ordinary conditions.

As mentioned above, the chest is of vanadium tungsten iron and is very simple in construction. The valve can be put in either way, and the chest is bushed one size larger than the supply pipe, thereby bringing but little wear on the threads of the chest itself. The hose can be attached to either side of the chest, and the exhaust on either side of the cylinder. The piston bushing is made of high-grade steel, carefully hardened and tempered on one side. A slot is milled on the soft side where the chuck key fits in, and not on one end of the bushing. By shearing down this slot with a thin cape chisel, the bushing can be completely removed. The cylinder is made of vanadium tungsten iron, the wearing qualities of which surpass those of every other metal used in making the cylinder. The cylinder is so constructed that the pressure can be made to ex-



CYLINDER OF AN IMPROVED ROCK DRILL

haust from either side. This is an original feature and is very desirable when operating a drill in confined places.

The piston is made of tough carbon steel in one solid forging. The nose of the piston is made extra large, which prevents the head from being split.

How to Keep Going in Spite of Cold Weather

A Material Which Speeds the Setting and Prevents the Freezing of Concrete a Big Help in Winter Work

THIS is the time of year when the contractor must be particularly on his guard, for freezing weather will ruin the best concrete unless it is properly protected. If the contractor is obliged to hold up his work because of freezing weather, he is losing money, as the jobs must lie over until the weather moderates. A material which greatly assists in overcoming the difficulties of concrete construction in winter is made by the General Fireproofing Company, Youngstown, Ohio, under the name of G-F 12 Cement Accelerator. With this material it is possible to work with concrete in temperatures as low as 17 degrees, which is about as cold weather as it is practicable for men to work in. The G-F 12 is added to the mixing water and is said to make a dense, hard, strong concrete which in no way affects the reinforcing steel.

This Cement Accelerator makes it possible

to carry on brick, stone, concrete or cement work during freezing weather without the expensive protection which must otherwise be provided. It raises the temperature of the mass and lowers the freezing point of the water. At the same time it speeds up the setting of the concrete so that there is no danger of freezing before it has properly set, though the temperature may take a big drop during the night.

In addition to its anti-freeze properties, G-F 12 has the advantage of setting cement work as hard in two days as ordinary work becomes in 30 days. Floors can be laid at the time of pouring arches, the forms removed and the floors walked upon. The floor topping can be troweled and finished two hours after pulling up, which means that the work can be practically monolithic. Two hours' overtime by the finishers is all that is required, with the rest of the gang putting in a full day.

NOTE THESE BULLETINS

The catalogs and pamphlets listed below are available for free distribution. Contractors and Engineers who check over these pages each month and write for such material as interests them, will find this a valuable means of keeping up to date on the subject of machinery and equipment.



CONCRETE ROADS CURED IN 10 DAYS

The use of Solvay calcium chloride for accelerating the initial and final set and increasing the early tensile strength of concrete, giving the new concrete greater plasticity and workability, increasing density and its freezing resistance, is told in a new booklet, "Concrete—Summer and Winter," which will be sent free on request by the Semet-Solvay Co., Dept. L, Syracuse, N. Y.

DOES YOUR MIXER REALLY MIX?

The advantages of the Koehring mixer in producing an easy-flowing, easily spouted concrete is told in the latest catalog of the Koehring Company, Milwaukee, Wis., which describes this company's heavy-duty construction mixers, pavers and the Dandle light mixer.

CUT YOUR HEAVY HAULAGE COSTS

The Garford Motor Truck Co., Lima, Ohio, says there is no job in contracting and building work that demands greater structural strength and more power in a truck than stone hauling. Contractors are up against this kind of work all of the time and will be interested in Garford's new truck operators' magazine, "Haul-Age," which may be secured regularly free on request.

SIMPLE AND EFFICIENT BODY HOISTS

With the racking and strains that a hoist has to stand on a motor truck, contractors want the best they can secure. Valuable information regarding the dependability, efficiency and simplicity of Wood-Detroit hydraulic hoists will be found in the literature of the Wood Hydraulic Hoist and Body Co., 7924 Riopelle St., Detroit, Mich.

SPECIALIZED WHEELBARROWS

The Sterling Wheelbarrow Co., Milwaukee, Wis., maker of specialized wheelbarrows built for the job, will be pleased to send its literature describing the features and qualities of this well-known product.

A 12-TON MACADAM ROLLER

The advantages of the new 12-ton Iroquois macadam roller, with its increased power, higher steam pressure and operating efficiency, are given in the latest literature of the Barber Asphalt Co., Land Title Bldg., Philadelphia, Pa.

A MONEY-SAVING PAINT

Booklet No. 148-B, the Joseph Dixon Crucible Co., Jersey City, N. J., gives some interesting long-service records of Dixon silica-graphite, which, it is claimed, lasts twice as long as cheap paint, thus saving in labor and material.

AN ENGINE BUILT FOR HARD USE

The Hercules Corp., Engine Div., Dept. B., Evansville, Ind., has issued some literature telling why it claims that the Hercules is the one engine a contractor can put on his job without ever having to coddle it or coax it.

SEMI-PNEUMATIC TRUCK TIRES

The success of Goodrich semi-pneumatic truck tires has revised the old standard of what a truck can do. Contractors wishing information on these tires may secure it from the B. F. Goodrich Rubber Co., Akron, Ohio.

TRUCKS FOR ALL PURPOSES

The Engineering Dept., International Motor Co., 25 Broadway, New York City, will be pleased to confer with contractors and municipal officials having special trucking problems. This company has specialized in the field and offers a comprehensive line of trucks and truck equipment in capacities from 1½ to 7½ tons, and tractors up to 15 tons.

PROTECTION BY EXPANSION JOINTS

The expansion joint made by the Waring-Underwood Co., Universal Trust Bldg., Philadelphia, Pa., is claimed to be the ideal method of providing for expansion in improved pavements—convenient, safe and economical. It is shipped in crates or boxes of about 325 pounds and is described in literature which may be secured from the above company.

HEAVY-DUTY CONCRETE MIXERS

Jaeger mixers with tilting drums, power loaders, tip-over water-tanks, hoists and engines are claimed to be the best the industry has produced. They are described in the latest catalog issued by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio.

STONE SPREADERS AND UNLOADERS

Burch Plow Works Co., Dept. B-12, Crestline, Ohio, in its literature tells why no road contractor's equipment is complete without the Burch stone spreader and the Burch stone unloader, the combination of which halves the labor cost of handling stone from cars to road-bed.

A MACHINE FOR ASPHALT ROAD WORK

The latest literature of Littleford Bros., 500 E. Pearl St., Cincinnati, Ohio, describes the new machine which this company has brought out for contractors using various grades of asphalt in street and road construction. The machine will also be exhibited at the Chicago Road Show, January 14-18.

STEEL JOIST CONSTRUCTION

The Truscon Steel Co., Youngstown, Ohio, has issued a series of data sheets on the adaptation of steel joist construction, discussing its fire-proof qualities, how and where used, and giving other useful data. This series may be secured by readers of Contractors' & Engineers' Monthly without charge.

WHITEWASH AND COLD WATER PAINTS

Bulletin 304 B, issued by the National Lime Association, Washington, D. C., describes the possibilities of whitewash and cold water paints and gives complete information on preparing surfaces and mixtures and formulas for exterior and interior use.

A NEW ONE-MAN TRACTOR SHOVEL

The new Insley tractor shovel, which is a one-man machine mounted on a Fordson tractor for excavating, ditching and light clam-shell work, is described in the literature of the Insley Mfg. Co., Indianapolis, Ind.

AN ALL-STEEL REVERSIBLE SNOW REMOVER

Two men, a team and a Martin snow remover made by the Owensboro Ditcher & Grader Co., Owensboro, Ky., are said to be able to clean more miles of sidewalk and streets in one day than several old-style outfits. This snow remover is described in illustrated folders which may be secured free on request.

DURABLE FLOOR AND STAIR TREADS

Wright rubber tile for floors and stair treads which have toughness to insure wearing qualities and are easily laid are described with appropriate illustrations in the literature of the Wright Rubber Products Co., Racine, Wis.

A REVERSIBLE RATCHET WRENCH

There is no lost motion nor lost time when you use a "Favorite" reversible ratchet wrench. This is one of the handiest tools you can have on any job. Prices and particulars may be secured from Greens, Tweed & Co., 109 Duane St., New York City.

GRADERS THAT PRODUCE MORE WORK

Adams adjustable leaning wheel graders, which, it is claimed, do more work per day per dollar of operating expense than any other type of grader, are described in the catalog which may be secured from Dept. CEM, J. D. Adams & Co., Indianapolis, Ind.

TRAILER TYPE CONCRETE MIXERS

The Packard tilter Ford trailer mixer, a machine that can be towed behind any light-weight auto truck and is equipped with rubber tires to make speedy transportation possible, is described in detail in the literature of the American Cement Machine Co., Keokuk, Iowa.

SPECIAL ROLLERS FOR SUBGRADERS

The special catalog issued by the Austin-Western Road Machinery Co., Chicago, Ill., describes the Austin Pup, a 3- to 4-ton one-man roller that does the same sort of work that an elaborate outfit costing five times as much will do.

A HIGH-AVERAGE MIXER OUTFIT

Atlas mixers which have a record of 120 to 150 cubic yards in ten hours as a steady output and which are equipped with multi-cylinder LeRoy engines giving excess power are described in the literature of the Atlas Engineering Co., 3336 Galena St., Milwaukee, Wis.

SPEED IN DIET MOVING

Contractors who have a grading job in mind will do well to get a copy of Catalog No. 96-A, which describes the work of Baker-Maney, which are self-loading steel scrapers and which can be handled in trains by any tractor, saving a great deal of man and mule power as well as money. Write to the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill.

TRACTORS WITH RESERVE POWER

The need of reserve power in a tractor engine is demonstrated time and time again as those which are not supplied with adequate motive power are stuck on grading operations or when handling show. Full information regarding the Bear tractor, which has a large percentage of reserve power, may be secured from Bear Tractors, Inc., 5333 Park Pl., New York City.

SOUND ADVICE ON ROAD ROLLERS

The conditions under which road rollers have to operate and the types of work they have to handle necessitate careful thought and judgment in picking the right kind of a road roller. The Buffalo-Springfield Roller Co., Springfield, Ohio, makes all kinds of road rollers, and its catalog A contains sound advice and information of help to any contractor.

TRACTOR TESTIMONY

The work which Best Thirty and Sixty tractors can handle is told in the literature of the U. L. Best Tractor Co., San Leandro, Calif., through information derived from contractors on the job.

RELIABLE PROTECTION AGAINST EXPANSION

Whether it be brick or block pavements, concrete pavements or concrete bridges or other similar structures, the Philip Carey Co., 9 Wayne Ave., Lockland, Cincinnati, Ohio, has developed a form and type of Elastite sandwich expansion joint for reliable service. Facts and a sample sent free on request.

POWER WHEN AND AS NEEDED

A statement of the reliability of Climax engines for the operation of all types of contracting machinery, as well as a list of the better grade of equipment operated by these machines, is given in the catalog of the Climax Engineering Co., 1 West 18th Ave., Clinton, Iowa.

HEATING BITUMINOUS BINDERS

The catalog of Connery & Co., Inc., 4000 N. Second St., Philadelphia, Pa., describes Connery's complete line of tar and asphalt heaters, which have distinct advantages and wearing qualities of interest to paving and roofing contractors.

PNEUMATIC CONCRETE DRILLS

The complete line of Dallett tools for bushing, drilling holes and cutting ducts in concrete is described in Bulletins 1043 and 1045, which may be secured from The Dallett Co., Philadelphia, Pa.

ROCK DRILLS AND HOISTS

High speed, high efficiency and satisfactory performance are three of the reasons why Waugh rock drills, made by and described in the literature of the Denver Rock Drill Mfg. Co., Denver, Colo., are so popular with contractors in highway work and quarrying.

REDUCING DETOUR TIME

The objection that concrete roads under construction hold up traffic and cause the use of detours for so long a time is overcome in large measure by the use of Dowflake for curing the concrete to cut down the "road closed" period from 21 to 10 days. Full information regarding this material will be found in the new Dow book "How to Cure Concrete," which may be secured from the Dow Chemical Co., 361 Jefferson St., Midland, Mich.

RESURFACING 1,500 SQUARE YARDS A DAY

The new, improved Equitable surface heater made by the Equitable Asphalt Maintenance Co., Kansas City, Mo., and described in detail in its specifications, is a gasoline machine which eliminates all dirt, water and steam and makes it possible to resurface without flame from 1,000 to 1,500 square yards of bituminous pavement in an 8-hour day.

ROAD ROLLERS THAT YOU CAN'T BREAK

Erie rollers are guaranteed against breakage or wear for five years, because their reputation since 1887 has shown that their strength and simple construction make them durable, economical and easy to operate. If you want more information, write to the Erie Machine Shops, Erie, Pa.

STEADY TRUCKS FOR ROAD WORK

The success of a road-building contractor depends on the speed and dependability with which stone, cement and other materials can be delivered to the job. The value of GMC trucks in this kind of work is told in the literature of the General Motors Truck Co., Pontiac, Mich., which may be secured free on request.

ROAD ROLLERS

Motor and steam road rollers furnished with and without pneumatic scarifier attachment and made to stand the hard usage necessary in subgrade work as well as finishing work, are described in the literature of the Galion Iron Works Mfg. Co., Galion, Ohio.

STEEL PAVING GUARDS

Illustrated catalog No. 23 issued by the W. S. Godwin Co., Inc., Race and McComas Sts., Baltimore, Md., describes the use of Godwin steel paving guards to protect the edges of streets, roads, curbs and street railway paving.

SNOW-PLOWS AND ROAD MACHINERY

Contractors can pick up a lot of good money during the winter by using their trucks with snow-plows and getting contracts from cities. Champion snow-plows, as well as the full line of road machinery, are described in the literature of the Good Roads Machinery Co., Inc., Kennett Square, Pa.

LOADING ROAD MATERIALS

The handling of crushed stone and sand from winter storage is facilitated through the use of truck loaders and portable conveyors such as are described in the literature of the George Haiss Mfg. Co., 142nd St. & Park Ave., New York City.

GRAVITY DUMP BODIES FOR FORDS

The new Dump-Quick Heil Ford platform gravity body, which easily lends itself to every purpose necessary for road contractors in handling sand, gravel, earth, crushed stone, etc., is described in Bulletin 130, which can be secured from the Heil Co., 1243 26th Ave., Milwaukee, Wis.

A STANDARD BUILDING MIXER

The 21-S Kansome standard building mixer, which has many exclusive features making it particularly valuable for building work, is described in literature which may be secured from the Kansome Concrete Machinery Co., 1772 Second St., Dunellen, N. Y.

TRACTORS THAT FINISH THE JOB

A tractor that might "lay down" in the middle of the job where there is a big stake and where the making or marring of a contractor's reputation is involved, is not the kind you want to buy. Instead, look into the Holt Caterpillar tractor, which has a well-founded reputation for carrying through and finishing the job. The work of these machines is described in the literature of the Holt Mfg. Co., Inc., Peoria, Ill.

BLADE GRADERS AND ELEVATING GRADERS

The Russell Grader Mfg. Co., Minneapolis, Minn., makes practically everything needed for road construction, road maintenance and road repairing, including its well-known seven sizes of road graders and three sizes of elevating graders, which are described in its complete catalog.

CATERPILLAR

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ONLY HOLT BUILDS IT

Holt invented the "Caterpillar."* Holt perfected the "Caterpillar" and established it as a positive success in every part of the globe. The "Caterpillar's" principles of traction and construction, found in Holt basic patents, were correct from the first. They have stood every conceivable service test. Holt quality has never varied, has never been compromised to meet a price. "Caterpillar" Performance has been the one standard by which any tractive work could be measured. That is why the world comes to Holt. That is why the United States and foreign governments found only the "Caterpillar" ready for tremendous military responsibilities. That is why the

greatest oil, lumber and mining companies, the most experienced engineers, contractors, road builders, public officials, farmers and ranch owners in over 57 different countries look to Holt to supply the most effective means of doing tasks too difficult and too important to entrust to any method or machine but the "Caterpillar." In every tongue, "Caterpillar" is a synonym for power, traction and economy. We invite correspondence from engineers, contractors, public officials and industrial firms in regard to any problems of overland hauling, dirt moving, snow removal or construction work.

* There is but one "Caterpillar"—Holt builds it

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Miscellaneous Notes

The Nichols-Evans Company

THE Nichols-Moore Company, advertising agents, of Cleveland, Ohio, has announced a change in name to The Nichols-Evans Company and the addition of Walker Evans, Jr., formerly of Blackman Company of New York and later with MacManus of Detroit, to its staff. The officers of the Nichols-Evans Company are Walker Evans, Jr., President; D. H. Nichols, Vice-President and Treasurer, and E. J. Witthoff, Secretary.

New Heil Distributors

THE Heil Company, Milwaukee, Wis., manufacturers of tanks for all purposes, steel dump-truck bodies and hydro-hoists for motor trucks, have announced the appointment of two new distributors, one at Toledo and one at St. Louis.

The Kranz Automotive Body Company, Gravois at Minnesota, St. Louis, Mo., has been appointed for that territory. The Shop of Siebert, 614 Southward Avenue, Toledo, Ohio, is the other new distributor. These two new distributors are the nineteenth and twentieth Heil Company distributors in the United States.

The Dallett Company

FOR a number of years the products manufactured by the Thomas H. Dallett Company have been known to and referred to as "The Dallett"—the Dallett tool, the Dallett plug drill, the Dallett surfacer, the Little Dallett, etc. Thus the name Dallett has become well known in stone-working tools, machinery and appliances. Because of this and also with the idea of simplifying the use of the name, the Thomas H. Dallett Company, 165-189 West Clearfield Street, Philadelphia, Pa., announces that its name has been changed to The Dallett Company.

New Assistant General Manager

THE Wood Hydraulic Hoist and Body Company, 7923 Riopelle St., Detroit, Mich., has announced that Frank H. Dewey, for two years Sales Engineer, has been made Assistant General Manager and will devote his time to the direction of sales promotion and advertising in cooperation with manufacturers and dealers. Mr. Dewey was formerly with the Horizontal Hydraulic Hoist Company, of Milwaukee, and joined the Wood Hydraulic Hoist and Body Company when the former company was absorbed by the latter. He was transferred to Detroit and placed in charge of advertising and sales development.

New 1-Ton Truck Model

THE General Motors Truck Company, Pontiac, Mich., has announced the standard production of a new 1-ton truck model with a long wheel-base. This new truck is built the same as the standard 1-ton model of the company, but will be made with a 150-inch

wheel-base at a list price \$275 in excess of the present figure. This truck was added to the line of the company to meet the demand for a small-capacity but long truck that would accommodate a long body for the carrying of light materials too bulky to be taken care of satisfactorily by the present model.

Chain-Belt Establishes New Direct Factory Branches

THE Chain-Belt Company, Milwaukee, Wis., manufacturers of Rex chain, transmission machinery and conveying equipment, have announced the establishment of direct factory branches and warehouses in Portland, Ore., and Seattle, Wash. Arrangements have also been made with the Washington Machinery Depot, Tacoma, Wash., to carry a large stock of Rex chain and transmission machinery. Other stocks will be placed in important centers throughout the Pacific Northwest for the prompt handling of local requirements.

The Northwest territory, with headquarters at Portland, will be in charge of Allen C. Sullivan, formerly connected with the Allis-Chalmers Company and more recently with Smith & Watson Iron Works of Portland, as Chief Engineer. Don B. Catton, formerly with Meese & Gottfried Company and later engaged in the machinery supply business on his own account, will be the special sales representative for the Portland office. The Seattle and British Columbia territory will be handled by William F. Nichols from the Seattle office.

The Portland office of the Chain Belt Company is located at 67-69 First Street, and the Seattle office at 1040 Sixth Avenue South.

G. D. Loomis Dies

GEORGE DUDLEY LOOMIS, who for many years had been at the head of the Loomis Machine Company and the Tiffin Wagon Company, both of Tiffin, Ohio, died at the age of 76 on November 1. In the announcement of Mr. Loomis' death, sent out by these companies, they state that the business of the companies will be continued in the spirit of integrity which Mr. Loomis set as a standard for his associates.

Book Review

DOMESTIC SANITATION AND HOUSE DRAINAGE.

Henry C. Adams, Past President, Institute of Municipal Engineers, England, Oxford University Press, American Branch, New York. 1923. XV + 227 pp. Illustrated. \$3.50.

A volume dealing with the subject of sanitary science as applied to individual houses, covering in detail by chapters the subjects of building sites, sanitary building construction, house drains, drainage materials and fittings, construction of drains, soil and waste pipe, ventilation of drains, water-closets, and sump-sinks, baths, laboratories and sinks, institution and school sanitation, cast iron drainage, stables and cowsheds, drain flushing and cleaning, drain testing, planning drainage systems, conservancy systems, house refuse, drainage law (England), water services, lighting and illumination, warming, ventilation and sanitary surveys.

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New P. & H. District Manager

THE Pawling & Harnischfeger Company, Milwaukee, Wis., has recently appointed N. P. Farrar as its District Manager, with offices at 605 Stephen-Girard Building, Philadelphia, Pa., and 50 Church Street, New York City.

Holt Moves New York Office

THE Holt Manufacturing Company, Inc., Peoria, Ill., has announced the removal of its New York office and Mount Vernon service station to 250 West 54th Street, New York City. The export and eastern sales offices and service department with permanent tractor exhibits and complete parts stocks henceforth will be located at the new address.

Draper to Handle Cemetery Improvements

THE town of Kings Mountain, N. C., of which H. C. Dwelle is Commissioner of Public Works, has retained E. S. Draper, landscape architect, and city planner, 11 East 5th Street, Charlotte, N. C., to make a survey and complete plans for improvement of an old cemetery and the development of a modern park cemetery of 20 acres.

New Blaw-Knox Representative

THE Blaw-Knox Company, Pittsburgh, Pa., has announced that Charles K. Wehn is now in charge of a special department devoted to Blaw-Knox standard steel buildings and structural steel in Illinois and adjoining states. In any construction problems of this nature Mr. Wehn will be available for consultation and personal engineering service. His headquarters will be in the Blaw-Knox Company's Chicago office in the Peoples Gas Building.

Annual Meeting of the American Institute of Steel Construction

THE Annual Meeting of the American Institute of Steel Construction will be held at the William Penn Hotel, Pittsburgh, Pa., on January 23 and 24. A program of unusual interest to those engaged in the structural steel industry has been prepared and will include addresses by several men prominent in the business world. The two-day session will be devoted to a discussion of the principal problems confronting the industry and consideration of a program to control the future activities of the Institute.

A banquet will be held on the evening of the 23rd and those in attendance will be rewarded by instructive addresses on subjects of general interest. Owing to the educational value of this meeting, a large representation of the industry is already assured. An invitation to attend the annual meeting is extended to those who are either directly or indirectly interested in the fabrication of steel for structural purposes, whether they are members of the Institute or not. Official programs and further details may be obtained from Charles F. Abbott, Executive Director, 350 Madison Avenue, New York City.

Stroud Business Continued

THE Little Red Wagon Manufacturing Company of Omaha, Nebr., has purchased the business of Stroud & Company of that city and will continue the manufacture of Stroud elevating graders, Stroud little red dump-wagons, Stroud road maintainers, scrapers, drags, plows and other road-making machinery. The new organization will also continue the Stroud parts service. Inasmuch as Stroud elevating graders and dump-wagons have been built in Omaha for over 25 years and there are a large number of these graders and wagons in use by contractors, the continuation of the Stroud parts service will be particularly helpful.

New West Florida Building Project

THE road-building program of West Florida has been increased by the letting of a contract for a half-million-dollar bridge between Escambia and Santa Rosa Counties, a short distance from the city of Pensacola. This bridge will be built with state and Federal aid. The contract, which was let on December 10 to the Hardaway Construction Company of Columbus, Ga., calls for completion within 365 days, including additional work.

There is a fill 12,385 feet in length, a trestle 5,585 feet long, and the total cost of the work will be about \$563,000. In addition, a steel bridge 500 feet in length and of an 80-foot span is necessary for the completion of the project. Contracts for these two items have not yet been let.

Changes in Sales Personnel

THE United States Cast Iron Pipe & Foundry Company, Burlington, N. J., has announced the appointment of H. A. Hoffer as Eastern Sales Manager, with headquarters at the Morris Building, 1721 Chestnut Street, Philadelphia, Pa. G. T. Overholt has been appointed acting New York Sales Agent, with headquarters at 71 Broadway, New York City, and Thomas Simons is appointed Kansas City Sales Agent, with headquarters at Interstate Building, Kansas City, Mo.

De Ducks Ran Away with de Profit

A COLORED contractor, after finishing a highway job which looked like a profitable venture, went to the bank to borrow some money.

"Why, Mr. Johnston," asked the Bank President with some surprise, "why do you wish to borrow money? Didn't you make enough money on the job just finished?"

"No, sah, I did not," answered the contractor. "De ducks ran away with de profit."

"I beg your pardon, sir, but I do not understand you," queried the financier.

"Well it's dis way, Mistah President. First the engineers deducted excavation, then they deducted rock, then they deducted cement, and after they got through with de rest of de ducks there was nothing for me."

—The Nerba.

THE ASSOCIATED EQUIPMENT DISTRIBUTORS

An organization composed of established, responsible Equipment Distributors of the United States whose purposes and ideals are to bring together in joint membership, for mutual advantages, all dealers who carry and maintain representative purchased stock, exclusively represent recognized manufacturers, carry parts and operate service department.

To stabilize our business, increase efficiency in purchasing management and sales.

To influence standardization and bring into close harmony the manufacturer, the distributor and the user of construction equipment.

Benefits to members can be measured in new friendships, co-operation, exchange of ideas, plans, systems, methods, materially increasing profits and consistent expansion.

Accomplishments

National recognition of the worth of the Association. Annual meeting at Milwaukee every January (preceding Road Show), where hundreds of manufacturers assemble as our guests for the purpose of personally meeting, and gaining opportunity of a program discussion of mutually interesting and vital subjects and problems.

Standardization of size of sheets, carrying out of a plan of standardized catalog itself, whereby every distributor may, at a minimum of expense, with the co-operation of live manufacturers, be enabled each year to publish a complete, representative catalog of his own.

Sponsoring National Editorials on subjects relating to manufacturing, distributing and contracting problems.

Simplifying parts business and securing uniform sheets of detail. Standardizing on contract form for universal adoption and many other equally beneficial services.

Making it possible and worth while to meet twice each year for business and frolic.

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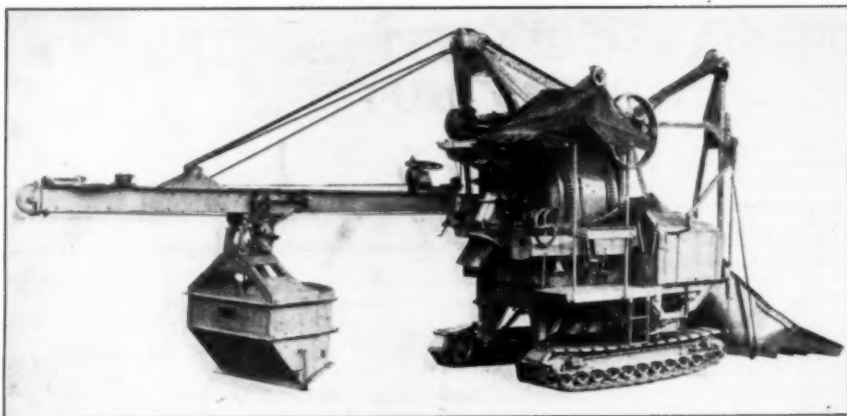
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A New Paver for City Work

A Large-Capacity Concrete Mixer with Special Head Frame Saves Headroom

FOR city paving work where a large-capacity paver is desired, the Koehring Company, Milwaukee, Wis., has developed a special design of head frame for its 21-E paver. The uprights supporting the sheaves through which the charging skip cables run, are bolted and hinged in such a way that after the bolts are removed the upper framework may be tipped back by the skip hoist clutch, thus reducing the height of the machine and allowing

it to pass beneath low telegraph wires and other obstructions. The minimum height of this Koehring 21-E paver with special frame is 10 feet 9¼ inches with truck wheels, 10 feet 11¼ inches with half-length multiplanes, and 11 feet 2½ inches with full-length multiplanes.

The arrangement also permits the loading of the machine onto a flat car for shipment without any dismantling further than the boom and skip.



SELDEN TRUCK OWNED BY THE HOUSTON CONSTRUCTION COMPANY, HOUSTON, TEXAS, ENGAGED IN PAVING WORK

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With Tarvia you can build the greatest mileage of serviceable non-skid highways with the funds available. Tarvia Roads can be

economically maintained for an indefinite period—give unlimited years of satisfactory road service.

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Carbic—Lights.
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Northwest—Cranes and Shovels.
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TEN years ago Kentucky Rock Asphalt was a comparative stranger outside the region where it is produced. Some scattered pavements were built in a wider territory, at much earlier dates, and it is the remarkable durability of these streets and highways which explains why, today, Kyrock is in use in more than half the states of the Union. Recent development of Kentucky Rock Asphalt on an extensive scale was made possible by the good roads movement and the Government's improvement of the Green River, over which Kyrock must be transported.

Kyrock is laid cold. It is thoroughly mixed by Nature, each grain of the aggregate being entirely coated with bitumen. Kentucky Rock Asphalt is shipped in open-top cars and is not susceptible to damage from the elements. Kyrock is uniform—always the same by analysis as the Kentucky Rock Asphalt used in the famous Camp Knox Road and other old rock asphalt pavements.

Thus, Kyrock has made it practicable to build the highest type asphalt pavements on highway projects and in smaller cities where physical difficulties and cost would prohibit the hot mix types. Batch burning, improper aggregate and other hazards attendant to laying hot asphalts have been eliminated by Kyrock. It always gives maximum results when laid on an adequate base with an observance of the ordinary principles of pavement construction.

Experience has proven that Kyrock pavements are most easily maintained and with less expense than any other high type. When it is necessary to cut the pavement, the surface may be restored by filling the hole with Kyrock and tamping. Under normal traffic the patch will bond so well that it may not be distinguished from the surrounding surface. Often the old Kyrock surface is broken up and used for patching. One man with a tamp and shovel can maintain miles of pavement.



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Kentucky, which has had the widest experience with Kyrock, reports the surface maintenance for 1922 as approximately one-half that of the other high type laid by the state. This, in spite of the fact that the average age of the Kyrock highways is several years greater.

In appearance, Kyrock may not be distinguished from a hot mix sheet asphalt. It is equal in every way and superior in many respects to the common hot mix types. Kyrock does not crack because it does not lose its life. The mineral aggregate is a hard silica sand, sharp and angular. It is the nearest non-skid pavement yet devised. Kyrock does not roll, buckle or bleed even in the warmest climate.

Kyrock is the brand of Kentucky Rock Asphalt quarried by the Kentucky Rock Asphalt Company, oldest and largest producers of rock asphalt. There are many rock asphalt deposits in Kentucky of no commercial value because of low bitumen content or inferior mineral aggregate. Kyrock comes from the same deposits from which came the rock asphalt used in the old pavements which have made Kyrock so well known.

Kyrock stands for uniformity, responsibility and service. Not only are the rock asphalt deposits drilled in advance, but the quarry faces are analyzed and charted. Each ton is laboratory tested before leaving the mills, and finally Kyrock in the cars is sampled and tested. Our engineering and construction department co-operates with engineers, officials and contractors from the drawing of the plans to the completion of the pavement.

We shall be glad to supply typical plans and specifications for Kyrock, using any standard base, or for surfacing and patching old macadam, brick, cement, concrete or gravel roadways. Literature describing Kyrock production and construction sent on request. Ask for booklet A C.

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Stop The Destruction of Costly Gravel Roads



J. W. Eubank, Chief Bureau Repairs, Maintenance and Cleaning, Richmond, Va., says: "It saves scarifying and resurfacing at least one hundred per cent."

J. D. Schafer, Supt. Public Works, Lansing, Mich., says: "Petitions were coming in every day from the people to have it used on their street."

E. Gay Doane, Engineer, Tunica, Miss., writes: "It is my opinion that *Dowflake* will pay for itself in the saving of surface which would otherwise blow away."

A dry, crumbling road wastes millions of tax money—covers home and countryside with a pall of dust and sends discomfort and disease in every direction.

You can save these road surfaces and control the dust nuisance at one and the same time by maintaining a moist, firm wearing cushion.

If you experiment with dry gravel and moist gravel you will see why dustless roads last longer, why resurfacing costs are cut in half and why motorists and roadside dwellers join with taxpayers in advocating "Road Maintenance by Dust Control."

An application of *Dowflake* twice a season will stop the shifting around and grinding together of dry crumbly gravel surfaces. With moisture in the road surface, rapidly moving wheels and heavy traffic pack road surfaces into a wonderful highway—without the moisture the same surface is thrown out and wasted.

Dowflake absorbs moisture from the air and retains this moisture in the road surface for months. It maintains the road and prevents dust, as hundreds of highway officials now know.

Write for the Manual "How to Maintain Roads," a book on road maintenance methods.



The Dow Chemical Company

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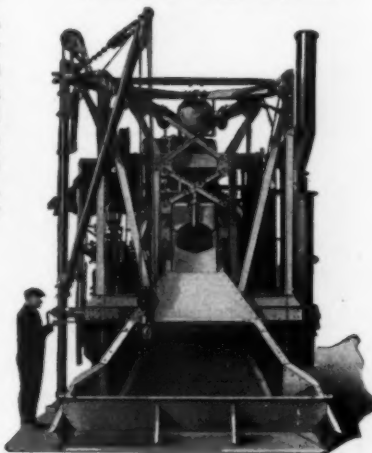
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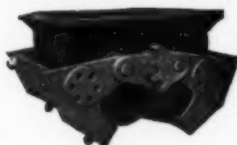
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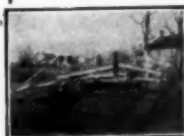
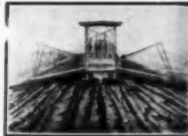
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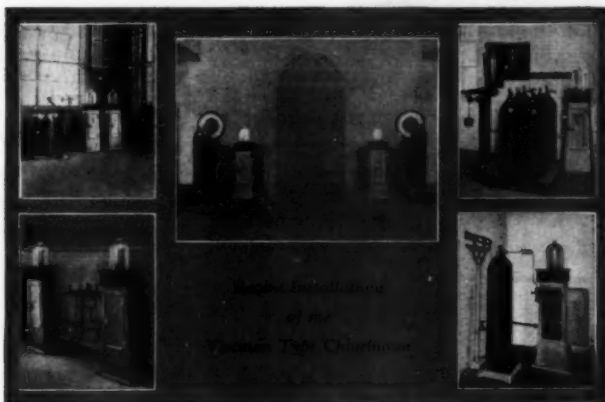
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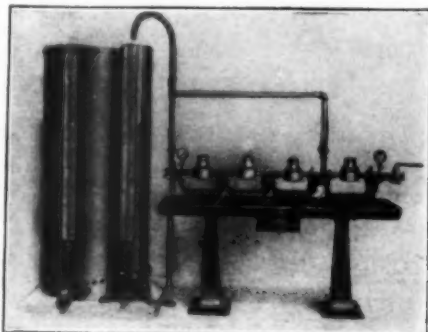


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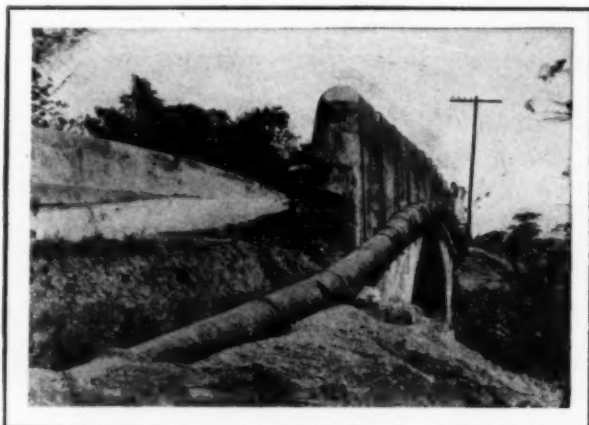


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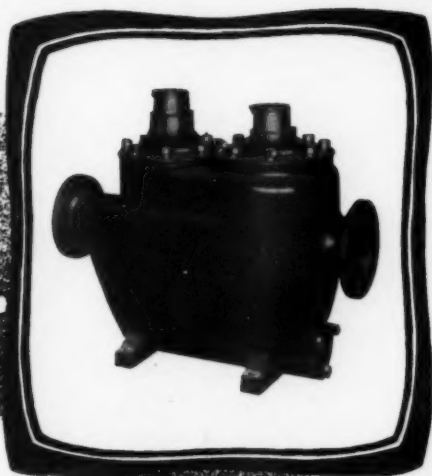
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